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Biogeographical Profiles of Shorebird Migration in Midcontinental North America

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By
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Prepared in cooperation with Prairie Pothole Joint Venture

U.S. Department of the Interior
U.S. Geological Survey

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Introduction

Transcontinental shorebird migrants are dependent upon dynamic freshwater wetlands throughout the interior of North America for stopover resources. Because of the tremendous energy demands of these long distance migratory flights, stopover habitats and resources for rest and refueling are critical to the survival and successful reproduction of this group of birds. Management of dispersed and dynamic wetland habitats for the conservation of en route shorebird migrants is a challenge that requires a broadly integrated approach across many geographic regions.

Thirty-seven species of shorebirds commonly cross the interior plains of North America during spring and fall migrations. Population sizes of several of these species are believed to be declining, including black-bellied plover (*Pluvialis squatarola*), mountain plover (*Charadrius montanus*), whimbrel (*Numenius phaeopus*), sanderling (*Calidris alba*), semipalmated sandpiper (*C. pusilla*), least sandpiper (*C. minutilla*), stilt sandpiper (*C. himantopus*), and short-billed dowitcher (*Limnodromus griseus*) (Howe et al. 1989; Knopf 1994; Morrison et al. 1994); there is growing concern about the status of these species.

Different areas in the midcontinent appear to host very different assemblages of shorebirds (Skagen and Knopf 1993; Skagen 1997). The biogeographic information described here will help identify the uniqueness of different regions of the plains to migrating shorebirds. Although shorebirds migrating along Atlantic and Pacific coastal areas are capable of long jumps between refueling stops, within the midcontinent region, the intermountain west, and the Pacific coast, some species move short, rather than long, distances between refueling sites (Skagen and Knopf 1994b; Iverson et al. 1996; Warnock and Bishop 1998). Maps of distribution patterns and chronology accounts can lend insight towards understanding migration strategies of the different shorebird species.

This report presents general distribution patterns of en route migrants that refuel in interior wetlands during migration. We provide information on the spatial and temporal occurrence and habitat requirements for individual species and groups of species with the intent that this information is used in guiding management efforts. We report general locations where shorebirds have been known to occur, whether regularly or occasionally, and do not suggest that individual sites are used by shorebirds every year. Yearly variation in numbers of shorebirds at specific sites is often great because shorebirds in the midcontinent respond quickly to changing habitat conditions (Skagen and Knopf 1994a; Warnock et al. 1998). The results of this project can be viewed on the Internet via the home page of the Midcontinent Ecological Science Center (MESC),

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Biological Resources Division, U.S. Geological Survey (BRD/USGS). The URL for this shorebird mapping project is:

http://www.mesc.usgs.gov/shorebirds

Study Area and Methods

Our focal area ranges across three provinces in Canada (Alberta, Saskatchewan, and Manitoba) and 18 states of the United States (Montana, Wyoming, Nevada, Utah, Colorado, Arizona, New Mexico, North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, Texas, Minnesota, Iowa, Missouri, Arkansas, and Louisiana).

The Database

We acquired shorebird survey and observational data from many sources (Table 1) in response to our requests (via letters, telephone, and e-mail). Major contributors included the International Shorebird Survey (Brian Harrington, Manomet Center for Conservation Sciences), Canadian Wildlife Service, Saskatchewan Wetland Conservation Corporation, U. S. Fish and Wildlife Service National Wildlife Refuges and National Parks in the focal states, Biological Resources Division of the U.S. Geological Survey, state natural heritage programs, and regional coordinators of the National Audubon Society Field Notes (NASFN). We visited and collected data from NASFN regional coordinators in Colorado, North Dakota, Iowa, Texas, and Oklahoma, and retrieved data from the Minnesota Ornithologist's Union archives, courtesy of R. Janssen. During each visit, we sorted through birding reports and miscellaneous data sent to the regional coordinators and photocopied data useful to the project. We obtained verbal permission from all contributors to use their data in summaries to be presented in a USGS document.

We determined geographic coordinates for most of the reported locations using sites on the Internet [Geographic Names Information System (GNIS), URL: http://mapping.usgs.gov/www/gnis/) and CD-ROMs at Colorado State University (MapExpert, GNIS)].

The database includes more than 33,000 records of observations and surveys conducted at about 3,000 sites (Fig. 1). Approximately one-fourth of the records (about 8,500) was contributed by the International Shorebird Survey. The types of data range from systematic and repeated surveys to non-systematic observations (Table 1). Although a few records date back to 1971, most (96%) of the records are from 1980 to 1996; 88% of the records are dated 1985 to 1996; and 65% are from 1990 to 1996. Observations and surveys were reported for approximately 2,300 sites from January through June (regardless of year) and for about 1,600 sites from July through December (Fig. 1). Sites in Texas and Louisiana include both coastal and inland wetlands. The locations were distributed approximately within 5° latitudinal bands as follows: 14% in 25° to 30°; 14% in 30° to 35°; 12% in 35° to 40°; 32% in 40° to 45°; 23% in 45° to 50°; 4% in 50° to 55°; and 0.1% in 55° to 60°. Most (<98%) of the sites occur east of 115° W longitude (Fig. 1) and survey coverage in the states of Nevada and Idaho is minimal.

Data Analysis

The shorebird distribution data were summarized using SAS (SAS 1990). Analyses were conducted for 37 individual species (Table 2; Latin names are provided) and for 12 species groups based on taxonomic group, body size, and migration distance (Table 2). Two species groups, all dowitchers and yellowlegs, enabled us to incorporate data for these two groups even though birds were not always identified to species. Species groups are:

- all shorebirds
- long distance migrants
- intermediate distance migrants
- short distance migrants
- all plovers
- small sandpipers (semipalmated sandpiper, western sandpiper, least sandpiper, white-rumped sandpiper, and Baird's sandpiper)
- medium sandpipers (greater yellowlegs, lesser yellowlegs, solitary sandpiper, spotted sandpiper, red knot, sanderling, pectoral sandpiper, dunlin, stilt sandpiper, buff-breasted sandpiper, short-billed dowitcher, and long-billed dowitcher)
- all small shorebirds (small sandpipers plus snowy plover, Wilson's plover, semipalmated plover, and piping plover)
- all medium shorebirds (medium sandpipers plus black-bellied plover, American golden plover, killdeer, mountain plover, ruddy turnstone, common snipe, Wilson's phalarope, and red-necked phalarope)
- all large shorebirds (black-necked stilt, American avocet, willet, whimbrel, long-billed curlew, Hudsonian godwit, and marbled godwit).

The migration distance categories (short, intermediate, and long) are defined in Skagen and Knopf (1993). These categories were based on a migration distance index (the weighted average of three distances between breeding and wintering areas: shortest distance, distance between estimated midpoints, and distance between extremes) roughly corresponding to the average

Table 1. Sources of shorebird data, including location(s), and person(s) who provided the data, type(s) of data, and year(s) encompassed by the data. Survey data are from repeated systematic surveys. Obs are observation data not from systematic surveys.

Source/location	Contact	Data type	Year(s)
Arkansas Audubon Society	Max Parker	Obs	1986–1995
Canadian Wildlife Service, Saskatchewan	Gerry Beyersbergen	Survey	1990–1993
International Shorebird Survey			
AR, AZ, CO, IA, KS, LA, MN, MO, MT, ND, NE, OK, SD, TX, UT	Brian Harrington	Survey	1975–1995
Minnesota Ornithologists' Union	Robert Janssen Peder Svingen	Obs	1986–1996
Miscellaneous Sources			
Boca Chica Beach, TX	Marty Bray	Survey	1992–1994
Great Salt Lake Region, UT	Peter Paton	Survey	1990–1993
Hornsby Bend Ponds, Austin, TX	Robin Doughty Barbara Parmenter	Survey	1993–1996
Playa Lakes Region, TX	Craig Davis	Survey	1993–1994
Northwestern North Dakota	Manuel DeLeon	Survey	1994–1995
Saskatchewan, Canada	J. Frank Roy[a]	Obs	1980–1995
Southern Louisiana	Ken Rosenberg	Survey	1986–1991
National Audubon Society Field Notes (NASFN)			
CO, NV, UT, WY	Hugh Kingery	Obs	1986–1996
IA, MT, ND, NE, OK, SD	Ron Martin Gordon Berkey	Obs	1986–1996
Iowa	Tom Kent	Obs	1986–1996
AR, CO, IA, IN, KS, MI, MN, MT, ND, NE, OK, Ontario	Joe Gryzbowski	Obs	1990–1996
Texas	Greg Lasley	Obs	1991–1996
Alberta, Manitoba, Saskatchewan	NASFN	Obs	1986–1995
National Park Service			
Big Bend National Park, TX	Mark Flippo	Obs	1986–1995
Homestead National Monument, NE	Rebecca Lacome	Obs	1986–1996
Rocky Mountain National Park		Obs	1996
Glacier National Park, MT	Steve Gniadek	Obs	1986–1995
New Mexico Natural Heritage Program			
Holloman Air Force Base, NM	Kris Johnson	Survey	1994–1995
U.S. Fish and Wildlife Service, National Wildlife Refuges (NWR)			
Anahuac NWR, TX	Kim Harrigan	Survey	1995–1996
Arrowwood NWR, ND	Carmen Luna	Survey, Obs	1994–1996
Audubon/Lake Nettie NWR's and surrounding areas, ND	Craig Hultberg	Obs	1986–1996

Table 1. Concluded.

Source/location	Contact	Data type	Year(s)
U.S. Fish and Wildlife Service, National Wildlife Refuges (NWR) (con't)			
Bear River Migratory Bird Refuge, UT	Vicki Roy	Survey	1991–1996
Benton Lake NWR, MT	Stephen Martin	Obs	1965–1995
Bitter Lake NWR, NM	Sonia Najera	Survey	1986–1996
Brazoria/San Bernard/ Big Boggy NWR's, TX	Richard Speer	Survey	1995
Breton NWR, LA	James Harris	Piping plover census	1996
Browns Park NWR, CO	Suzanne Fellows	Obs	1989–1996
Buenos Aires NWR, AZ		Obs	1990–1996
Felsenthal NWR/Oakwood Unit, AR	Lake Lewis	Survey	1995–1996
Fish Springs NWR, UT	Jay Banta	Survey	1986–1996
Halfbreed/Hailstone/Spidel NWR's, MT	Mike Getman	Obs	1991–1993
Hagerman NWR, TX	Jim Williams	Survey	1990–1996
Imperial NWR, AZ	Carmen Kennedy	Survey	1993–1995
Laguna Atascosa, NWR, South Padre Island, TX	Tim Brush	Survey	1992–1994
Laguna Atascosa NWR, TX	Tim Brush Jeff Rupert	Survey	1995–1996
Lake Andes NWR, SD	Rick Cantu	Obs	1986–1996
Lee Metcalf NWR, MT		Obs	1991–1996
Matagorda NWR, TX	Felipe Prieto	Survey	1992–1995
Maxwell NWR, NM	Jerry French	Obs	1989–1995
National Bison Range, MT	Lynn Clark	Obs	1987–1996
North Platte/Crescent Lake NWR's, NE	Larry Malone	Survey	1986–1996
Rice Lake/Mille Lacs NWR's, MN	Christopher Lapp	Survey	1991–1996
Sequoyah NWR, OK	Craig Heflebower	Obs	1989–1996
Squaw Creek NWR, MO	Joanna Foster	Survey, Obs	1986–1996
Swan Lake NWR, MO	Bridget Olson	Obs	1995–1996
Salt Plains NWR, OK	Ron Shepperd	Survey	1989–1996
Selected NWR's in AR, LA, MS	Virginia Rettig[a]	Survey	1994
USGS, Biological Resources Division KS, ND, NE, OK, SD, TX	Susan Skagen	Survey	1989–1995
Wader Study Group Bulletin	Colwell et al.[a]	Survey	1984
	Dickson et al.[a]	Survey	1987
Western Hemisphere Shorebird Reserve Network Alberta, Manitoba, Saskatchewan, Canada	Morrison et al.[a]	Obs	1971–1994

[a]Data compiled from published reports. See Cited References.

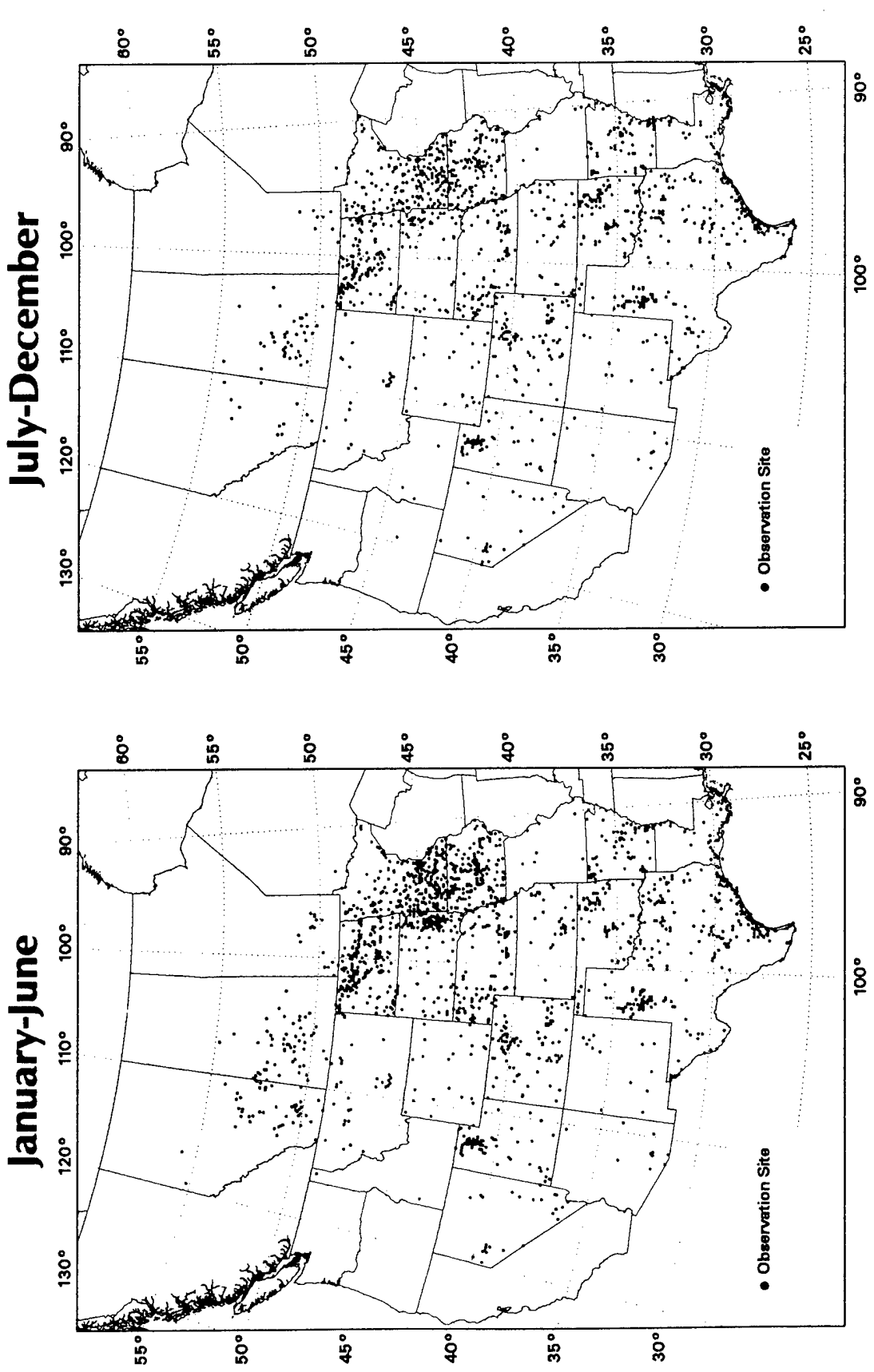


Fig. 1. Sites from which shorebird survey and observation data were collected.

Table 2. Shorebird species that commonly cross the North American interior during spring and fall migrations or that breed or winter in the midcontinent region. Body size is denoted by S (small, total body lengths of <190 mm); M (medium, body lengths range from 195–350 mm); and L (large, body lengths exceed 350 mm); after Skagen and Knopf (1993). Migration distances are denoted as S (short), I (intermediate), and L (long), after Skagen and Knopf (1993).

Common name	Scientific name	Body size	Migration distance	Selected references[a]
	Family Charadriidae			
Black-bellied plover	*Pluvialis squatarola*	M	I	1–5
American golden plover	*P. dominica*	M	L	1–4, 6
Snowy plover	*Charadrius alexandrinus*	S	S	1–4, 7
Wilson's plover	*C. wilsonia*	S	S	1–4
Semipalmated plover	*C. semipalmatus*	S	I	1–4
Piping plover	*C. melodus*	S	S	1–4, 8
Killdeer	*C. vociferus*	M	S	1–4
Mountain plover	*C. montanus*	M	S	1–4, 9
	Family Recurvirostridae			
Black-necked stilt	*Himantopus himantopus*	L	S	1–4
American avocet	*Recurvirostra americana*	L	S	1–4, 10
	Family Scolopacidae			
Greater yellowlegs	*Tringa melanoleuca*	M	I	1–4, 11
Lesser yellowlegs	*T. flavipes*	M	I	1–4
Solitary sandpiper	*T. solitaria*	M	I	1–4, 12
Willet	*Catoptrophorus semipalmatus*	L	S	1–4
Spotted sandpiper	*Actitis macularia*	M	I	1–4, 13
Upland sandpiper	*Bartramia longicauda*	M	I	1–4
Whimbrel	*Numenius phaeopus*	L	I	1–4, 14
Long-billed curlew	*N. americanus*	L	S	1–4
Hudsonian godwit	*Limosa haemastica*	L	L	1–4
Marbled godwit	*L. fedoa*	L	S	1–4
Ruddy turnstone	*Arenaria interpres*	M	I	1–4
Red knot	*Calidris canutus*	M	I	1–4
Sanderling	*C. alba*	M	I	1–4
Semipalmated sandpiper	*C. pusilla*	S	I	1–4, 15
Western sandpiper	*C. mauri*	S	I	1–4, 16
Least sandpiper	*C. minutilla*	S	I	1–4, 17
White-rumped sandpiper	*C. fusicollis*	S	L	1–4, 18
Baird's sandpiper	*C. bairdii*	S	L	1–4
Pectoral sandpiper	*C. melanotos*	M	L	1–4, 19
Dunlin	*C. alpina*	M	I	1–4, 20
Stilt sandpiper	*C. himantopus*	M	L	1–4, 21

Table 2. Concluded.

Common name	Scientific name	Body size	Migration distance	Selected references[a]
	Family Scolopacidae (con't)			
Buff-breasted sandpiper	*Tryngites subruficollis*	M	L	1–4, 22
Short-billed dowitcher	*Limnodromus griseus*	M	I	1–4
Long-billed dowitcher	*L. scolopaceus*	M	I	1–4
Common snipe	*Gallinago gallinago*	M	S	1–4
Wilson's phalarope	*Phalaropus tricolor*	M	I	1–4, 23
Red-necked phalarope	*P. lobatus*	M	I	1–4

[a]References: 1–Hayman et al. (1986); 2–Griggs (1997); 3–National Geographic Society (1987); 4–Howell and Webb (1995); 5–Paulson (1995); 6–Johnson and Connors (1996); 7–Page et al. (1995); 8–Haig (1992); 9–Knopf (1996); 10–Robinson et al. (1997); 11–Elphick and Tibbitts (1998); 12–Moskoff (1995); 13–Oring et al. (1997); 14–Skeel and Mallory (1996); 15–Gratto-Trevor (1992); 16–Wilson (1994); 17–Cooper (1994); 18–Parmelee (1992); 19–Holmes and Pitelka (1998); 20–Warnock and Gill (1996); 21–Klima and Jehl (1998); 22–Lanctot and Laredo (1994); 23–Colwell and Jehl (1994).

distance traveled (1,000s of km). The migration distance index of short distance migrants is <5, of intermediate distance migrants is 6–12, and long distance migrants is >14.

We divided all data into 24 time periods, beginning with days 1 and 16 of each month. For 50 sites with multiple subsites, numbers of birds of each species/species group were summed for all subsites for each 2-week time period to provide overall counts for the sites. A mean lat-long (latitude-longitude) calculated from the subsites was then assigned to the site. For 130 sites reported by more than one source, we standardized site names to avoid duplication.

We extracted the maximum number of individuals of each species and species group reported at each site/subsite for each time period. For the chronology histograms, maximum counts at sites/subsites for each species/species group and each time period were summed within 5° latitudinal bands (25°– 30°; 30°–35°; etc). For the maps and Appendix, we subdivided the year into two parts, January through June and July through December, extracted the maximum number of individuals of each species/species group reported at each site/subsite regardless of year, and totaled these counts for lat-long cells (0.1° by 0.1°).

The spring and fall data were processed separately in an ARC/INFO point vector coverage. The spring and fall point coverages were intersected with a polygon vector coverage which was divided into 100 km x 100 km grid. The values for each species and species group were summed within each cell and the resulting values were stored in the polygon vector coverage. Distributions of species and species groups were mapped with shading patterns to designate varying abundance. Distribution maps of species are presented in taxonomic order following the maps of species groups.

Histograms were constructed for each species and some species groups to describe timing of migration across seven 5° latitudinal bands. Because abundances differ between latitudinal bands, and because we wanted these figures primarily to portray timing, we used different scales for many of the bands. Shading patterns denote relative abundance (darker shades are used for greater numbers of birds). The chronology histograms are presented in concert with the distribution maps for each species in taxonomic order and for some of the species groups.

We used as an index of dispersion the number of sites hosting 60% of the total maximum of each species. We then categorized dispersion as broadly dispersed (60% of birds occurred in 10 or more sites), moderately dispersed (60% of birds occurred in 3 to 9 sites), or concentrated (60% of birds occurred in 1 or 2 sites).

There are limitations to our abilities to interpret the maps and histograms because the underlying data are from several sources and data types, because coverage is

not uniform, and because sites were not randomly or systematically chosen. These maps and summaries, therefore, are meant to provide baseline information on which to build in the future. All interpretations and statements are made with full recognition of the limitations of this database.

Identification of Important Sites

In the Appendix, we present the total maximum counts recorded for each species and species group in descending order of abundance. The counts represent the sum of the maximum counts of each site within 0.1° x 0.1° lat-long cells. We also provide the names of major sites within the identified lat-long cells. The values for latitude and longitude represent the center of the cell. Species summaries are presented in taxonomic order. Because large numbers of shorebirds are notoriously difficult to count, and because we suspect some large counts to be overestimates, we transected counts of six species and the respective species groups.

The classification of areas as sites or subsites is problematic because the final maximum numbers differ whether an area is considered a site or a series of subsites. In general, large continuous areas that were divided into subsites for survey purposes (i.e., national wildlife refuges) were treated as one site. An exception to this is the Great Salt Lake area that we treated as several individual sites because of the vast area represented (>15,000 km^2 compared with <500 km^2 for other sites). Eight sites within the Great Salt Lake area contained 95% of the shorebird sightings. For reference, we also ran the programs treating Great Salt Lake as one site, and present the counts in the Appendix. In general, maximum counts at Great Salt Lake were 12% lower in spring and about 46% lower in fall using the single site analysis rather than the multiple subsite approach. This difference is consistent with greater concentration of birds in the spring.

Data from 112 playa lakes in northwestern Texas (Davis 1998 and unpublished data) were treated each as an individual site. The primary difference if we had treated the entire playa lake region as one site is that additional entries in the Appendix would appear for this region. The maximum number of killdeer in spring was 180, American avocets in spring was 810, and long-billed curlew in fall was 974.

Results and Discussion

Map Interpretation

We categorized the maps and assigned species to one of five general patterns of migration (Figs. 2 and 3) based on the January through June coverage. Species with little data on migration distribution or with little or no division between wintering and breeding areas (snowy plover, Wilson's plover, mountain plover, black-necked stilt, American avocet, and long-billed curlew) were not assigned to one of these general migration patterns. The five patterns, narrow band, widespread, narrow band and widespread, jumps, and crossband, are graphically portrayed in Fig. 2 and described below.

Narrow Band

This category includes all of the long distance migrants, five intermediate distance migrants, and one short-distance migrant (Fig. 3). During spring migration more than 90% of the maximum counts of these species were within a narrow band extending between 90° W (the easternmost areas in this study) and 100° W longitude, roughly from eastern Iowa to central Kansas (Fig. 2); this band curves westward to between 100° W and 115° W longitude in Canada. These species are dispersed south to north along this band, extending from 25° N to 55° N latitude, with a preponderance of sightings in the prairie potholes. This pattern may change with additional survey coverage, especially in Manitoba.

Narrow Band and Widespread

Many individuals of two species, least sandpipers and short-billed dowitchers, occurred throughout the focal area, yet a large component of their populations (80–90% of maximum counts) were within a narrow band described above. Although the two are classified as intermediate distance migrants, some individuals may be long distance migrants.

Jump

Four species of intermediate distance migrants (ruddy turnstone, red knot, sanderling, and dunlin; Fig. 3) that winter along the Texas coast appear to overfly much of

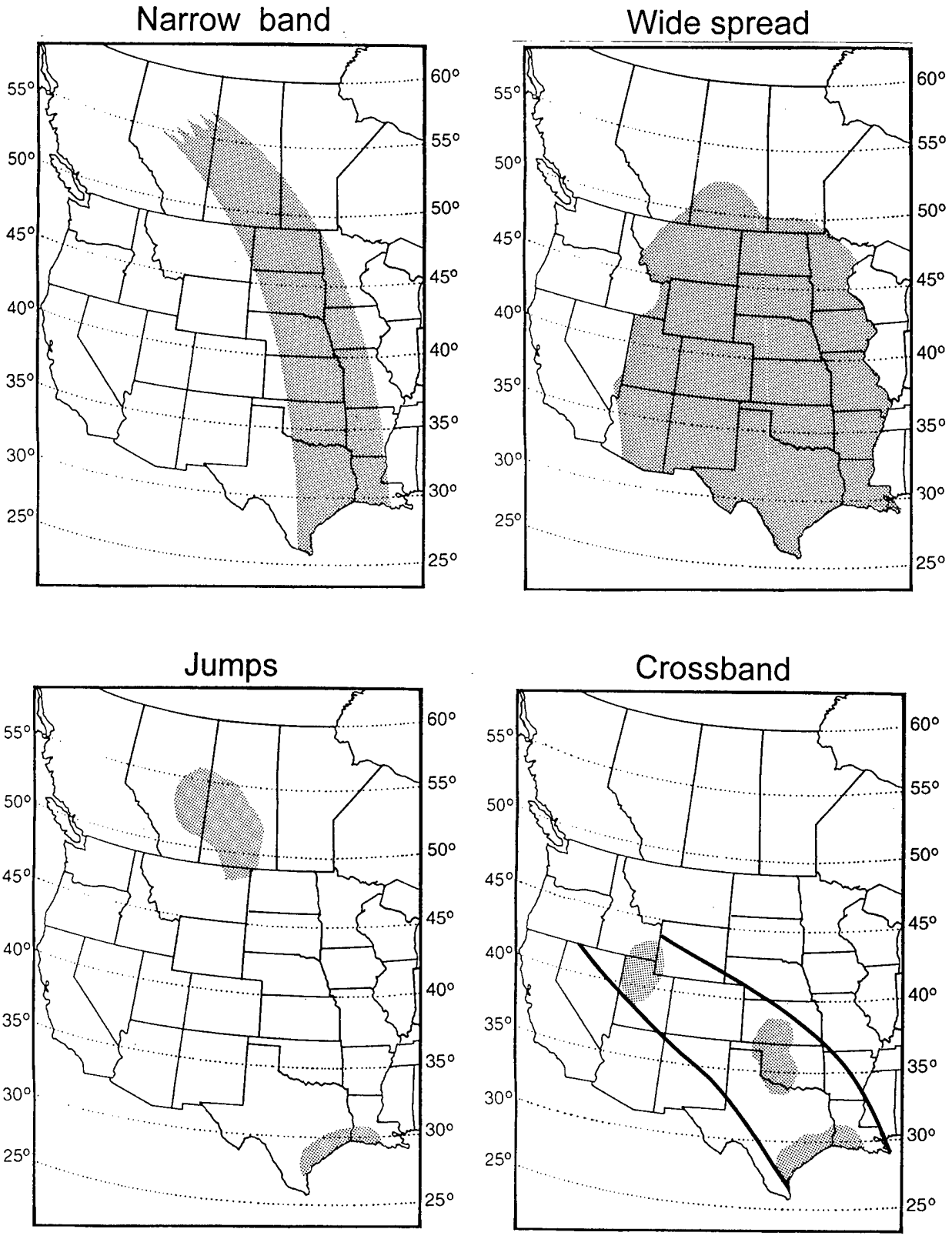


Fig. 2. Patterns of migration exhibited by shorebirds based on January through June coverages.

Migration pattern	Migration Distance		
	Short	**Intermediate**	**Long**
Narrow band	Piping plover	Upland sandpiper Semipalmated sandpiper Semipalmated plover Greater yellowlegs Lesser yellowlegs	American golden plover Hudsonian godwit White-rumped sandpiper Baird's sandpiper Pectoral sandpiper Buff-breasted sandpiper Stilt sandpiper
Narrow band and widespread		Least sandpiper Short-billed dowitcher	
Jump		Ruddy turnstone Red knot Sanderling Dunlin	
Widespread	Killdeer Willet Marbled godwit	Black-bellied plover Solitary sandpiper Spotted sandpiper Whimbrel Long-billed dowitcher Wilson's phalarope Red-necked phalarope	
Crossband		Western sandpiper	

Fig. 3. Classification of shorebirds by migration pattern and migration distance.

the plains. Sightings of these migrants in the central plains are infrequent and of relatively small numbers, but large numbers have been recorded in one or more northerly areas.

Widespread

Several intermediate distance migrants and short-distance migrants that breed in the U.S. (Fig. 3) were distributed broadly throughout our focal area, although some occurred in large numbers at a few sites. Birds that migrate through Western Nevada generally use the Pacific Flyway (Warnock et al. 1998).

Crossband

Western sandpipers (Fig. 3) winter along the coasts of the southern U.S., Central America, and northern South America, and breed in northwestern Alaska. During spring migration across the interior, this species is found in the greatest numbers between the Texas coast and the Great Salt Lake region and is infrequently sighted in the Northern plains.

Migration Chronology

The chronology histograms are intended to portray timing rather than spatial distribution or abundance; coverage and abundances differ between latitudinal bands. The histograms suggest two general patterns, hereafter called the quick passage and graduated arrivals. The Hudsonian godwit best represents the first pattern. Most (>90%) of the sightings occur in the midcontinent region during short time periods, late-April and May, and the sightings occur concurrently in latitudinal bands from 25° N to 50° N, suggesting that birds in need of refueling/resting fall out at several places regardless of latitude. There is no suggestion that individual birds stop more than once in this path. White-rumped sandpipers, which also pass through the plains during a short time period, represent a variant of this quick passage pattern. The earliest arrivals of this species, however, stop in the south, first appearing along the Texas coast (25–30° N) in late April and first occurring between 35° N and 55° N during early May. White-rumped sandpipers depart the Texas coast by late May, yet remain in the northern bands (35° N–55° N) into early June.

American golden plovers depict the second pattern, graduated arrivals, most clearly. The plovers first appear along the Texas coast (25–30° N) in late February/early March and disperse from there by late April. Their arrival dates farther north correspond with latitude, becoming later with increasing latitude. They arrive in 30–35° N in late March, 40–45° N in late April, and 50–55° N in early May. Semipalmated sandpipers also show a graduated pattern, arriving in 25–35° N in late March, from 35° N– 45° N in April, and from 45° N–55° N in May. A more gradual arrival pattern is demonstrated by stilt sandpipers; they appear in substantial numbers on the Texas coast in February, move northward from 30° N–40° N in early April, appear between 40° N and 50° N in early May, and in 50°–55° N in late May.

Although the chronology histograms may suggest patterns, we cannot distinguish between different explanations for these patterns without further analyses or additional data. For example, graduated arrivals in different latitudinal bands may suggest that individuals are making short flights while moving northward. But this same pattern may occur if later arriving individuals settled north of earlier arriving individuals.

Spring Migration of the Genus Calidris - Preliminary Interpretations

This document provides insights about migration strategies of individual species and can be used to formulate new hypotheses and to evaluate existing ones. We demonstrate this with preliminary interpretations of spring migration patterns of 10 species comprising the genus *Calidris*.

Wintering habitat, migration distance, and breeding destination in concert appear to determine spring migration distribution. For example, five species in the genus Calidris that winter predominantly in the South American interior (semipalmated sandpiper, white-rumped sandpiper, Baird's sandpiper, pectoral sandpiper, and pectoral sandpiper) are considered "narrow band" migrants, those that occur mainly between 90° W and 100° W longitude as they cross the midcontinent region. Calidridines that winter in more northerly interior habitats are more widespread in distribution during migration. Least sandpipers winter in the southern United States and throughout Central and northern South America and are classified as "narrow band and widespread" because although they occur primarily between 90° W and 100° W longitude, they also range more westerly during migration.

The occurrence of birds all along the "narrow band", coupled with gradual arrival patterns at more northerly latitudes, suggest that some species make flights of short to intermediate distances ["hops" and "skips"; Piersma (1987)] rather than long distances ("jumps") between stopover sites. Semipalmated sandpipers, least sandpipers, and Baird's sandpipers are the most likely of the calidridines to "hop"; they are gradual in arrival pattern and broadly distributed along the "narrow band".

Least sandpipers are considered more "diffuse" and less concentrated at stopover sites than other calidridines (Cooper 1994). Highly variable fat levels and flight range estimates of semipalmated sandpipers suggest that many individuals departing central Kansas are not capable of long flights (Skagen and Knopf 1994b).

Pectoral sandpipers also probably make several feeding stops punctuated by short flights during northward migration across the North American interior (Farmer and Wiens 1999). An abnormally high count (18,700) in central Kansas in late May somewhat obscure the "gradual arrival" pattern in our chronology histograms. However, other counts in central Kansas average less than 300 during late May. Male and female pectoral sandpipers may differ in spring migration strategies. Farmer and Wiens (1999) conclude that female pectoral sandpipers are both time minimizers and energy maximizers, whereas males are strictly time minimizers in spring migration. Males migrate through Oklahoma earlier than females (Oring and Davis 1966; Holmes and Pitelka 1998).

Stilt sandpipers appear to have somewhat longer inter-stop flights, concentrations of stilt sandpipers along the Gulf Coast and in Kansas, North Dakota, and Saskatchewan but not elsewhere indicate that migration movements involve flights of hundred of miles (Klima and Jehl 1998). An alternative explanation for the patterns of gradual arrivals and broad distribution along the narrow band is that later migrants may settle to refuel at more northerly sites than earlier arrivals. Currently, we have no additional evidence to distinguish between these alternative hypotheses.

In contrast to the calidridines discussed above, white-rumped sandpipers do not arrive more gradually at more northerly latitudes. Rather, they appear to arrive at latitudes between 35° N and 55° N almost simultaneously and do so all along the south-north "narrow band", suggesting the concurrent termination of longer flights. Estimates of flight distances of birds departing the central plains (Skagen and Knopf 1994b), however, suggest that most birds do need to refuel before reaching their breeding grounds. White-rumped sandpipers employ both "short-distance multiple-stop" and long-distance non-stop" flight patterns when crossing South America (Harrington et al. 1991; Parmelee 1992) and probably do so across North America as well.

Calidridine species that winter exclusively in coastal habitats are more likely to make long flights to specific regions during spring migration than interior wintering birds. We categorized the migration strategies of three *Calidris* species (red knot, sanderling, and dunlin) as "jump" because they appear to overfly the central plains as they proceed northward. During migration, red knots occurred in the largest numbers along the Gulf Coast and shores of large lakes of Saskatchewan, but not elsewhere. Red knots that breed in western North America are believed to winter along the southern Pacific and southern Atlantic and Gulf Coasts of North America and in southern coastal regions of South America, whereas breeders from Greenland and northeast Canada cross the North Atlantic to winter in western Europe (Hayman et al. 1986). If this is so, the birds recorded in Saskatchewan may have been refueling after a long flight from the Gulf and southern Atlantic coasts. Although some red knots are present along the Gulf Coast throughout the winter, a large influx of birds in late April and early May indicates that migrants from more southerly wintering areas use these areas as stopovers as well. This species is believed to typically make long flights between stopover sites (Hayman et al. 1986).

Sanderlings occurred in the largest numbers along the Gulf Coast, the Great Salt Lake area, and along shores of large lakes of Saskatchewan and Alberta, and only small flocks were recorded elsewhere. Sanderlings traveling northward along the Pacific Coast of South America apparently continue north through Texas and the Central Plains (Myers et al. 1990); this species is known to typically fly long distances between sites (Hayman et al. 1986). That they occur in large numbers in Saskatchewan and not elsewhere in the Central Plains is consistent with a jump strategy, but whether sanderlings in Saskatchewan originate on the Pacific or Gulf coasts is not clear.

Dunlin wintering on the Gulf Coast (*Calidris alpina hudsonia*) appear to overfly the Central Plains, but to occur regularly and in large numbers in the Prairie Pothole Region of eastern North and South Dakota. The limited numbers recorded in the midcontinent except the Dakotas suggest that birds migrating through the interior may fly directly from Gulf Coast wintering sites to the Prairie Potholes before their final flight to the breeding grounds (Warnock and Gill 1996).

The migration pattern exhibited by the Western sandpiper differs from all other calidridines crossing the midcontinent. Our findings support the earlier interpretations of a "diagonal" migration (Senner and Martinez 1982; Butler et al. 1996) of western sandpipers especially during southward migration and of smaller numbers in the interior during spring migration (Wilson 1994). Three birds banded in British Columbia have been recaptured in Kansas (Senner and Martinez 1982; Butler et al. 1996) supporting the ideas that some individuals are splitting off the Pacific Coast route to cross portions of the continent (Senner and Martinez 1982).

Habitat Requirements

Habitats used by shorebirds migrating across the midcontinent region include a variety of types, including beaches; tidal flats; sand flats; alkali lakes; margins of lakes, ponds, wetlands and reservoirs; plowed and fallow agricultural fields; sewage treatment plants; and lagoons. We describe the range of microhabitats used by foraging birds in the species accounts in terms of water depth and vegetation structure. Sources contributing to this information include Helmers (1992), Hayman et al. (1986), and Birds of North America accounts.

Because in general, body size is a useful indicator of the water depths used by foraging birds, we grouped species accordingly to facilitate management applications. In general, small shorebirds require relatively unvegetated wet mud and shallow water of depths ranging to 5 cm, medium sandpipers and yellowlegs up to 10 cm, and large shorebirds up to 20 cm.

Management Applications

This document can be used to identify areas critical to migrating shorebirds, to assist in decisions on conservation and acquisition efforts, and to provide planners and land managers with a perspective of scale necessary to properly manage for migrating shorebirds in the interior of North America. In addition to highlighting key migratory stopover areas, the maps also demonstrate the expanse of landscape used by shorebirds, supporting the idea that many shorebird species depend upon the accumulative effect of many smaller wetlands over a large area (Skagen and Knopf 1993; Skagen 1997).

This document can help ensure that habitat management activities coincide with shorebird use of habitats. Land managers can use the distribution maps to determine what species or groups of shorebirds are expected to occur in areas of interest, use the chronology histograms to predict the timing of migration, and use the species accounts to ascertain the preferred wetland microhabitats. For example, wetlands in eastern South Dakota host many small sandpipers throughout May. If possible, land managers should provide substrates that are bare or only sparsely vegetated and covered with water no deeper than 5 cm to accommodate these birds. Medium sandpipers, common in central and northern North Dakota from late July through the end of September, use a variety of habitats with up to 12 cm of water. American golden plovers, which use sparsely vegetated wetlands and fields with up to 8 cm of water, are prevalent in eastern North Dakota from mid-September to mid-October.

Ideally, management for shorebirds in the midcontinent will take place within the broader context of integrated wetland management for a diversity of wildlife species and will take a landscape approach that is based on the paradigm of wetland habitats as dynamic systems (Laubhan and Fredrickson 1993, 1997; Skagen 1997). As such, a reasonable goal is not to provide the required microhabitats for migrating birds at the same wetlands each season if doing so compromises wetland health. Rather, we should assure that sufficient suitable habitats occur somewhere on the larger landscape. Interior-migrating shorebirds have evolved with unpredictable stopover resources and are able to find suitable microhabitats in a temporally dynamic and spatially complex landscape.

Distribution Maps and Migration Information for Species Groups and 37 Shorebird Species

On pages 16 to 113, distribution maps for two time periods (January–June and July–December) are provided for species groups (all shorebirds, long distance migrants, intermediate distance migrants, short distance migrants, all plovers, small sandpipers, medium sandpipers, all small shorebirds, all medium shorebirds, and all large shorebirds) and for 37 shorebird species in taxonomic order (see Table 2 for order). The shading patterns on the distribution maps indicate the sum of the maximum number of birds recorded at each site regardless of year within a 100 km^2 cell. Refer to the Appendix for more specific count information and locations. Histograms portraying the timing of migration across 5° latitudinal bands from 25°N to 55°N are provided for all species and most species groups. See the Data Analysis section for further explanation of methods. The locations with the greatest number reported for each species/species group are based on information from the Appendix.

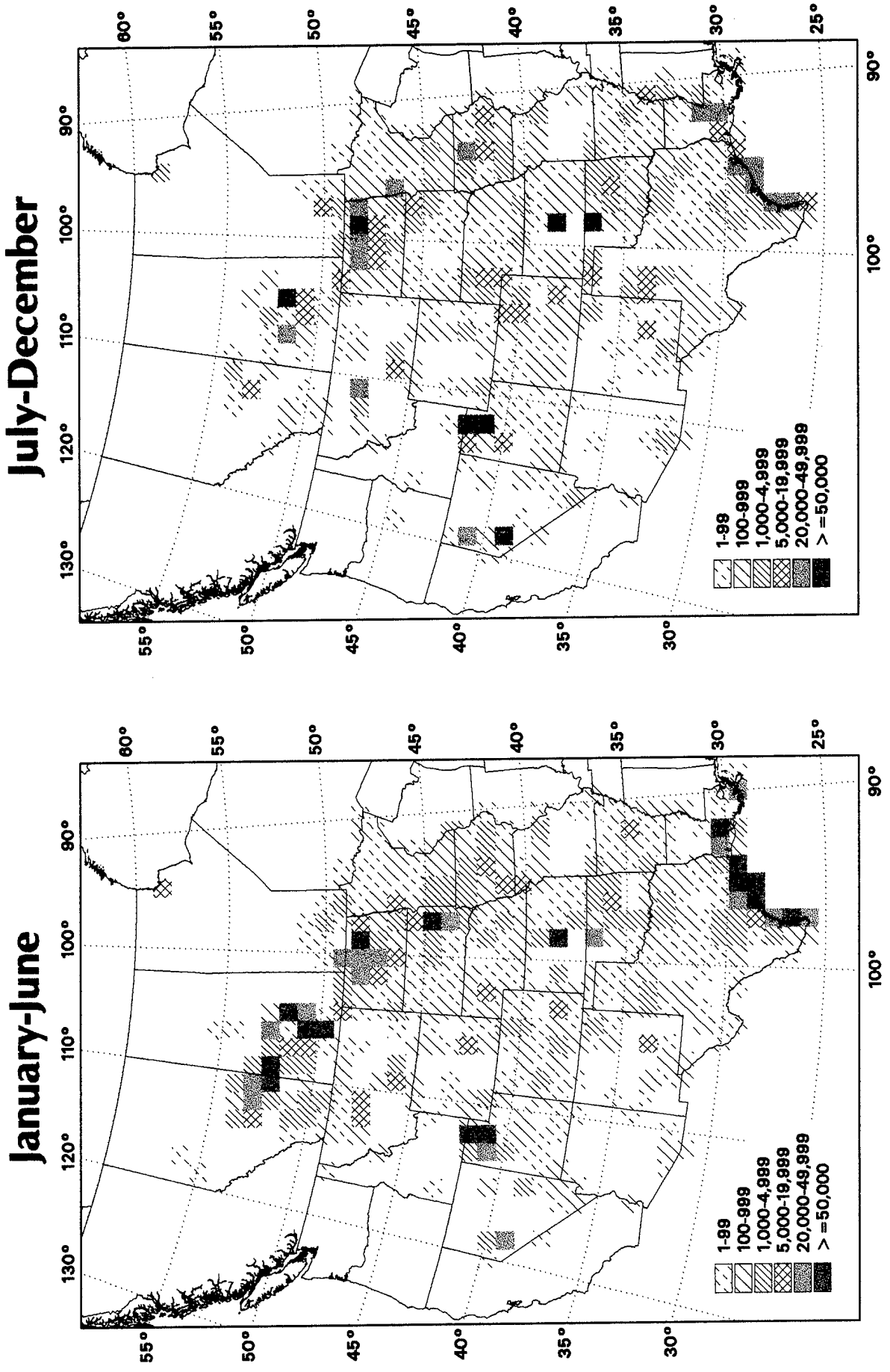
Chronology histograms were constructed by summing the maximum number of species/species group reported at each site across seven 5° latitudinal bands for 24 time periods, two time periods per month. Note that there are different scales on the various graphs, identified by shading patterns denoting relative abundance (darker shades are used for greater numbers of birds). The chronology histograms are intended to portray timing

rather than spatial distribution or abundance; coverage and abundances differ between latitudinal bands.

Range maps were constructed using information contained in Hayman et al. (1986), Morrison and Ross (1989), Howell and Webb (1995), and respective Birds of North America accounts. On the range maps, solid black denotes breeding range, the stippled pattern denotes winter range, and the hatched pattern denotes year-round residency.

Reference to Figs. 2 and 3 will help in identifying overall patterns relative to migration distance (see maps for species grouped by migration distance). The distribution maps for species groups based on body size can be used in concert with the chronology histograms to suggest guidelines for land managers. Species were grouped by body size as an overall indicator of habitat requirements relative to water depth.

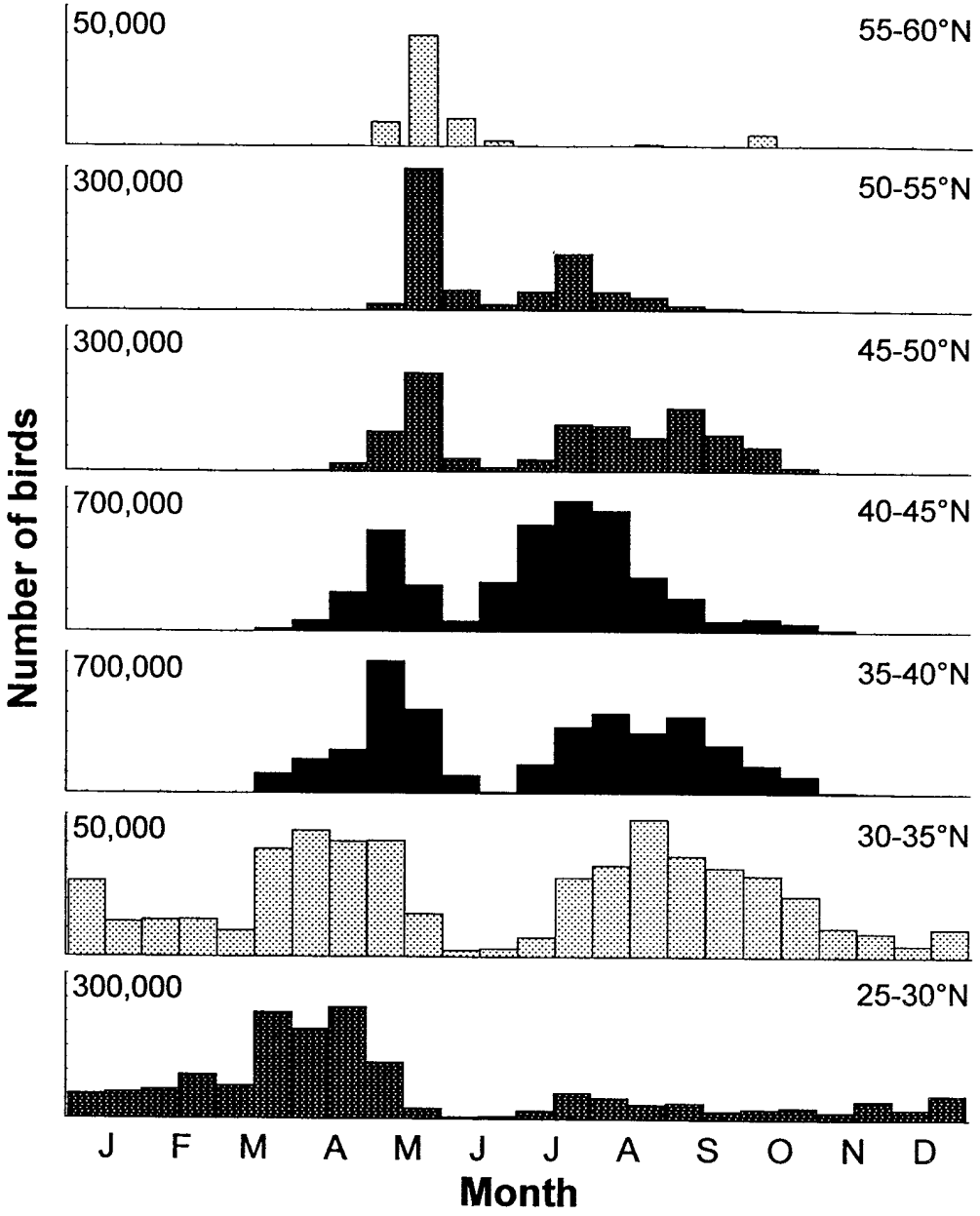
Distribution Maps and Migration Information for Species Groups and 37 Shorebird Species

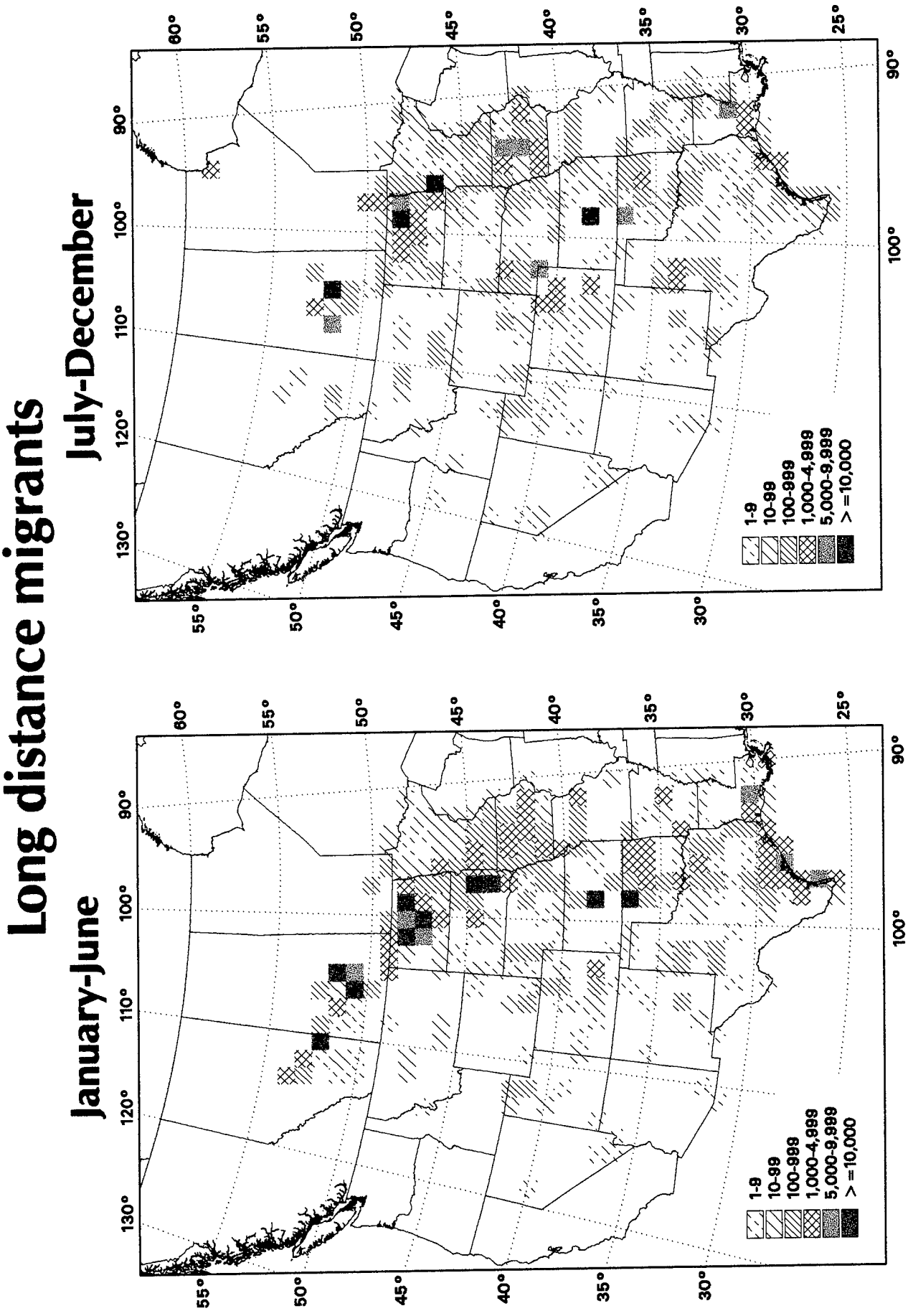

All shorebirds
January-June
July-December
1-99
100-999
1,000-4,999
5,000-19,999
20,000-49,999
> =50,000
80°
55°
50°
45°
40°
35°
30°
25°
90°
100°
110°
120°
130°

All Shorebirds

Fifteen sites with highest counts:
(see Appendix for more information)

Cheyenne Bottoms Wildlife Management Area, Kansas
Great Salt Lake area, including Bear River National Wildlife Refuge, Utah
Quill Lakes, Saskatchewan
Lahontan Valley, Nevada, including Carson Lake and Stillwater National Wildlife Refuge
Laguna Atascosa National Wildlife Refuge, Texas
Minnewaukan Flats, Devil's Lake, North Dakota
Chaplin Lakes, Saskatchewan
Old Wives Lake, Saskatchewan
Salt Plains National Wildlife Refuge, Oklahoma
Bolivar Flats, Galveston Island, Texas
Brazoria National Wildlife Refuge, Texas
19 km west of Luck Lake, Saskatchewan
Between Duson and Crowley, Louisiana
Devil's Lake, North Dakota

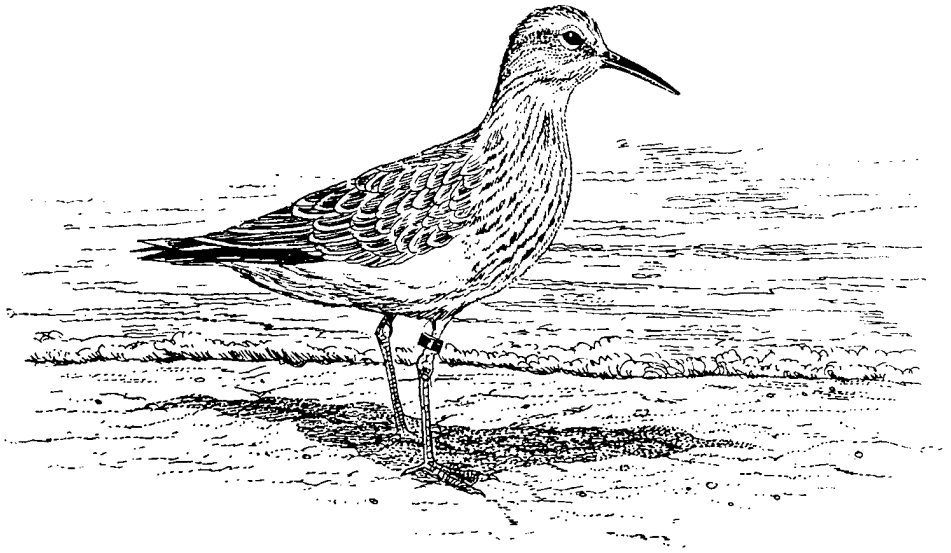


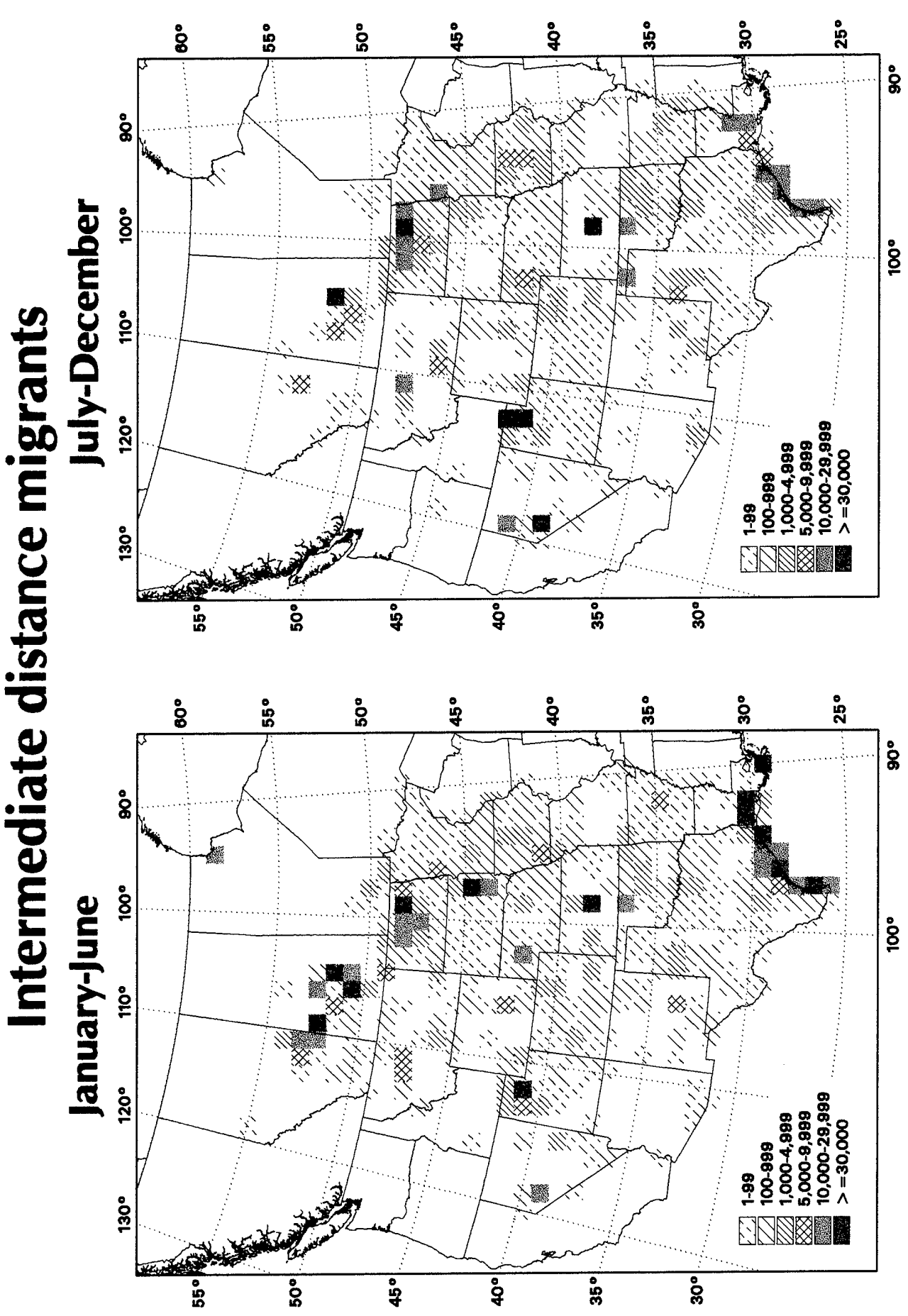

Long distance migrants
January-June
July-December
1-9
10-99
100-999
1,000-4,999
5,000-9,999
> = 10,000
60°
55°
50°
45°
40°
35°
30°
25°
90°
100°
110°
120°
130°

Long Distance Migrants

American Golden-Plover
Hudsonian Godwit
White-rumped Sandpiper
Baird's Sandpiper
Pectoral Sandpiper
Stilt Sandpiper
Buff-breasted Sandpiper

Body Size: Small, medium, large
Foraging Guild: Terrestrial/aquatic prober/gleaner
Six sites with highest counts: (see Appendix for more information)
Cheyenne Bottoms Wildlife Management Area, Kansas
Minnewaukan Flats, Devil's Lake, North Dakota
Quill Lakes, Saskatchewan
Chaplin Lakes, Saskatchewan
Dry Lake, Clark County, South Dakota
Salt Plains National Wildlife Refuge, Oklahoma

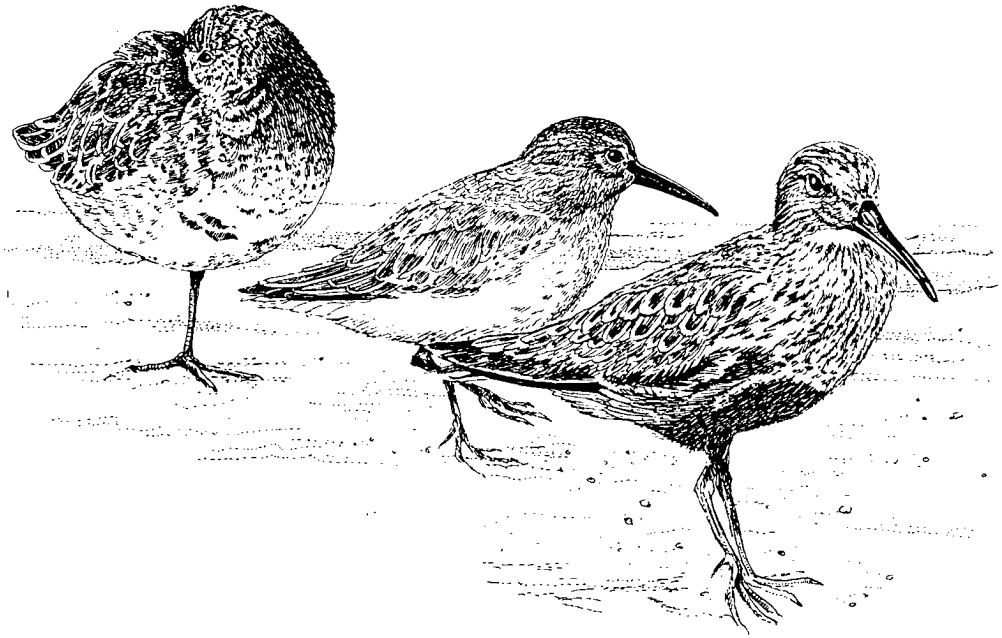


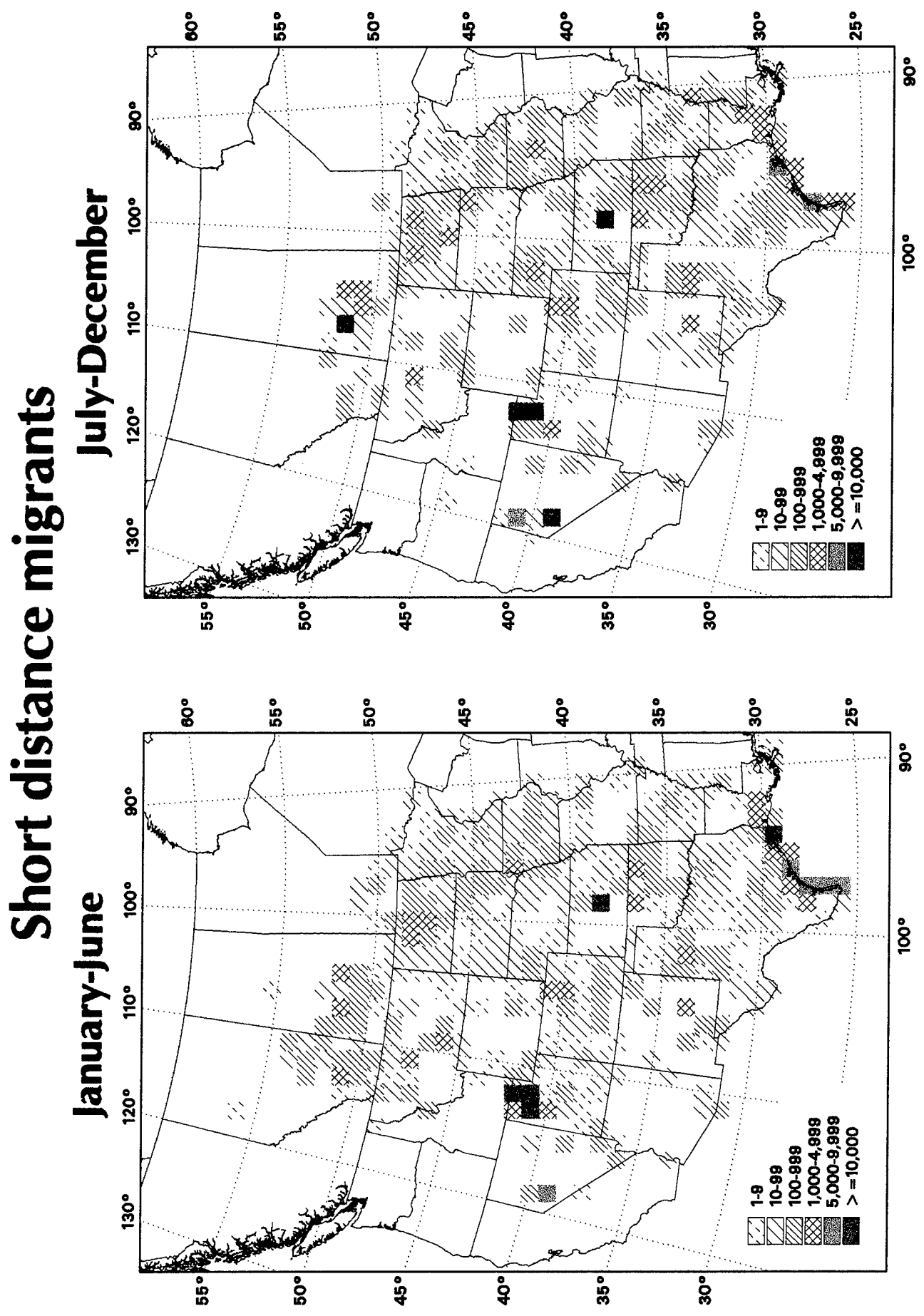

Intermediate distance migrants
January-June
July-December
1-99
100-999
1,000-4,999
5,000-9,999
10,000-29,999
> =30,000
60°
55°
50°
45°
40°
35°
30°
25°
130°
120°
110°
100°
90°

Intermediate Distance Migrants

Black-bellied Plover	Sanderling
Semipalmated Plover	Semipalmated Sandpiper
Greater Yellowlegs	Western Sandpiper
Lesser Yellowlegs	Least Sandpiper
Solitary Sandpiper	Dunlin
Spotted Sandpiper	Short-billed Dowitcher
Upland Sandpiper	Long-billed Dowitcher
Whimbrel	Wilson's Phalarope
Ruddy Turnstone	Red-necked Phalarope
Red Knot	

Body Size: Small, medium, large
Foraging Guild: Terrestrial/aquatic prober/ gleaner/pelagic gleaner
Six sites with highest counts: (see Appendix for more information)
Cheyenne Bottoms Wildlife Management Area, Kansas
Great Salt Lake area, Utah
Quill Lakes, Saskatchewan
Laguna Atascosa National Wildlife Refuge, Texas
Lahontan Valley, Nevada, including Carson Lake and Stillwater National Wildlife Refuge
Minnewaukan Flats, Devil's Lake, North Dakota

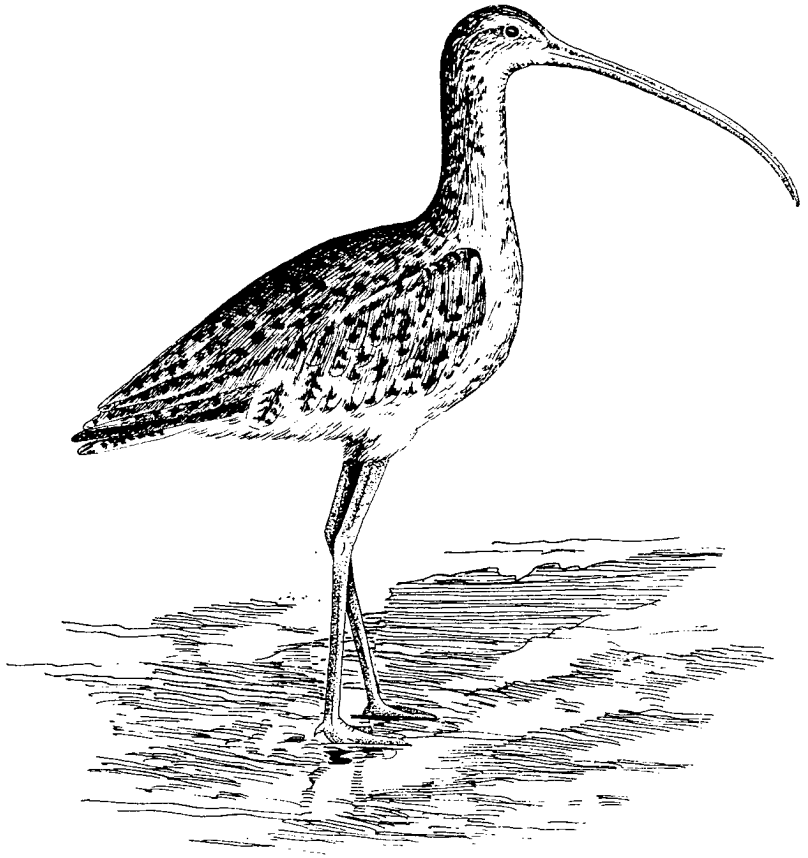


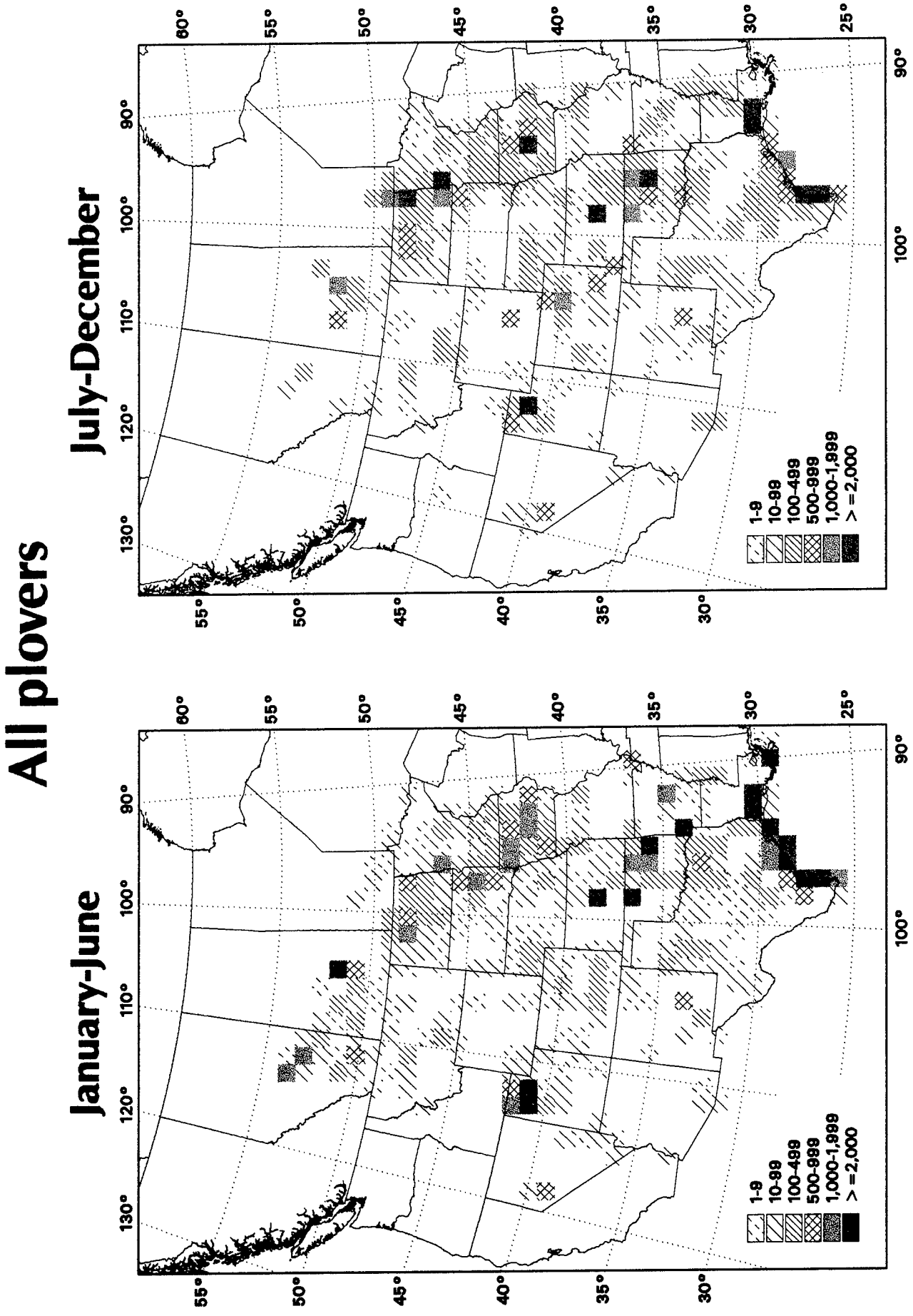

Short distance migrants
January-June
July-December
1-9
10-99
100-999
1,000-4,999
5,000-9,999
> =10,000
130°
120°
110°
100°
90°
60°
55°
50°
45°
40°
35°
30°
25°

Short Distance Migrants

Snowy Plover
Piping Plover
Wilson's Plover
Killdeer
Mountain Plover
Black-necked Stilt
American Avocet
Willet
Long-billed Curlew
Marbled Godwit
Common Snipe

Body Size: Large
Foraging Guild: Terrestrial/aquatic prober/ gleaner/sweeper
Six sites with highest counts: (see Appendix for more information)
Great Salt Lake area, Utah
Lahontan Valley, Nevada, including Carson Lake and Stillwater National Wildlife Refuge
Cheyenne Bottoms Wildlife Management Area, Kansas
Bolivar Flats, Galveston Island, Texas
19 km west of Luck Lake, Saskatchewan
Boca Chica Beach, Cameron County, Texas

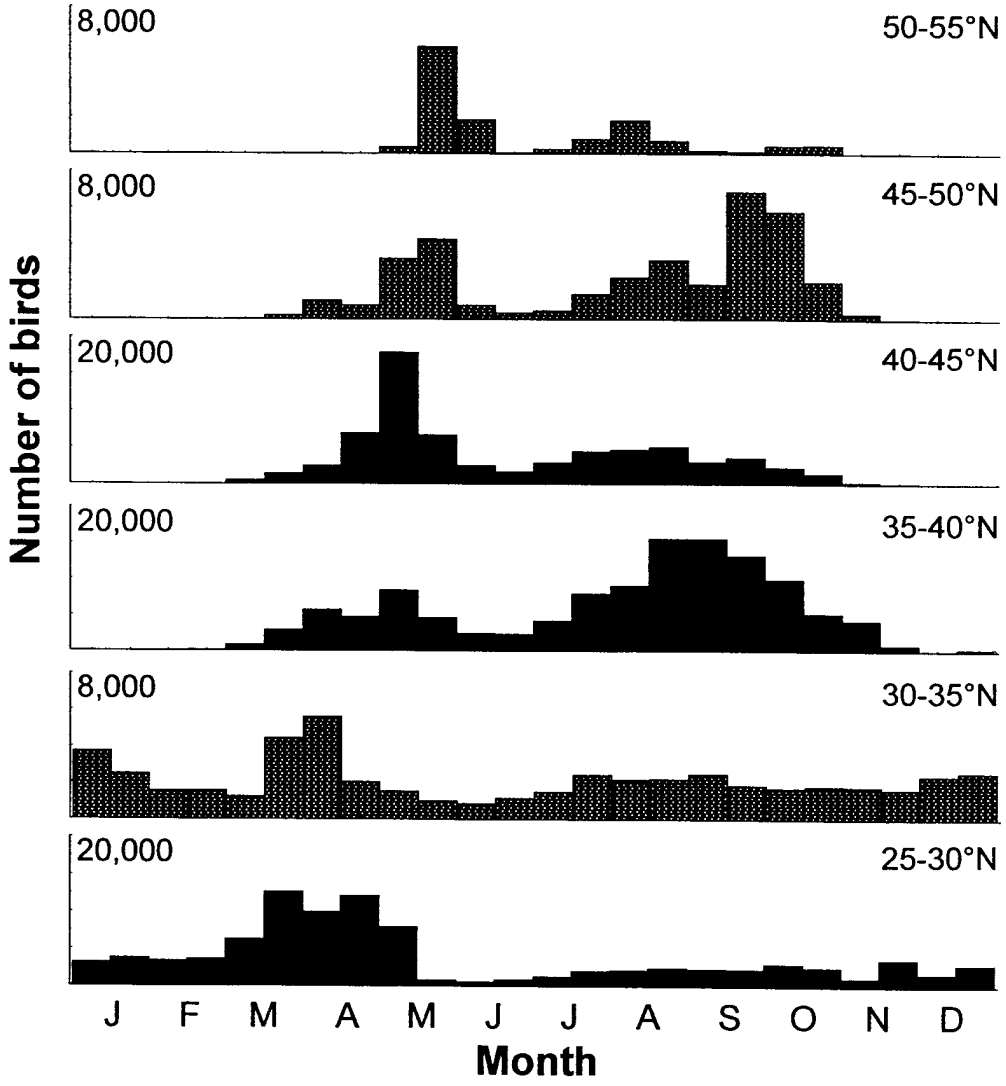



All plovers
January-June
July-December
60°
55°
50°
45°
40°
35°
30°
25°
90°
100°
110°
120°
130°
1-9
10-99
100-499
500-999
1,000-1,999
> =2,000

All Plovers

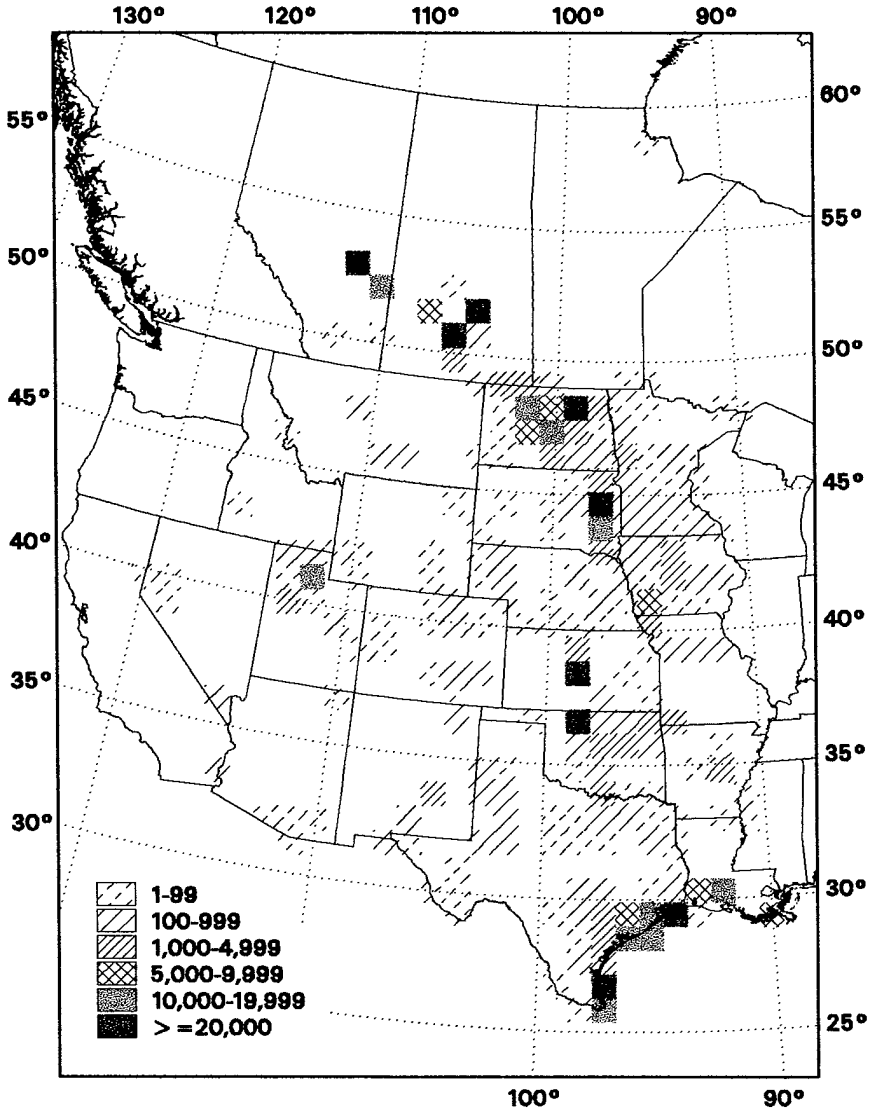
Black-bellied Plover
American Golden-Plover
Snowy Plover
Wilson's Plover
Semipalmated Plover
Piping Plover
Killdeer
Mountain Plover

Body Size: Small, medium
Foraging Guild: Terrestrial/aquatic gleaner
Foraging Habitat: Water depth - dry/wet to 2/10 cm; vegetation cover - bare to dense
Six sites with highest counts: (see Appendix for more information)
Great Salt Lake area, Utah
Cheyenne Bottoms Wildlife Management Area, Kansas
Laguna Atascosa National Wildlife Refuge, Texas
North Dakota State University, Fargo, North Dakota
Between Duson and Crowley, Louisiana
Salt Plains National Wildlife Refuge, Oklahoma

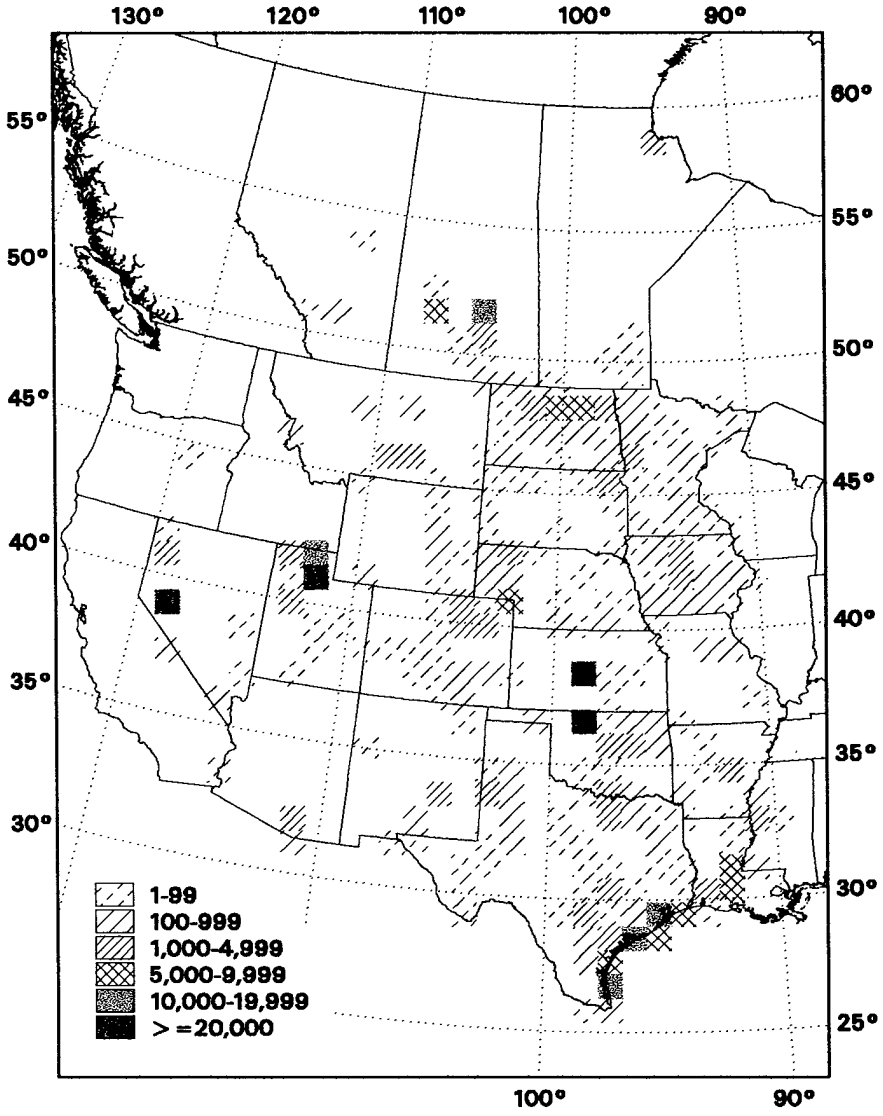


Small sandpipers

January-June



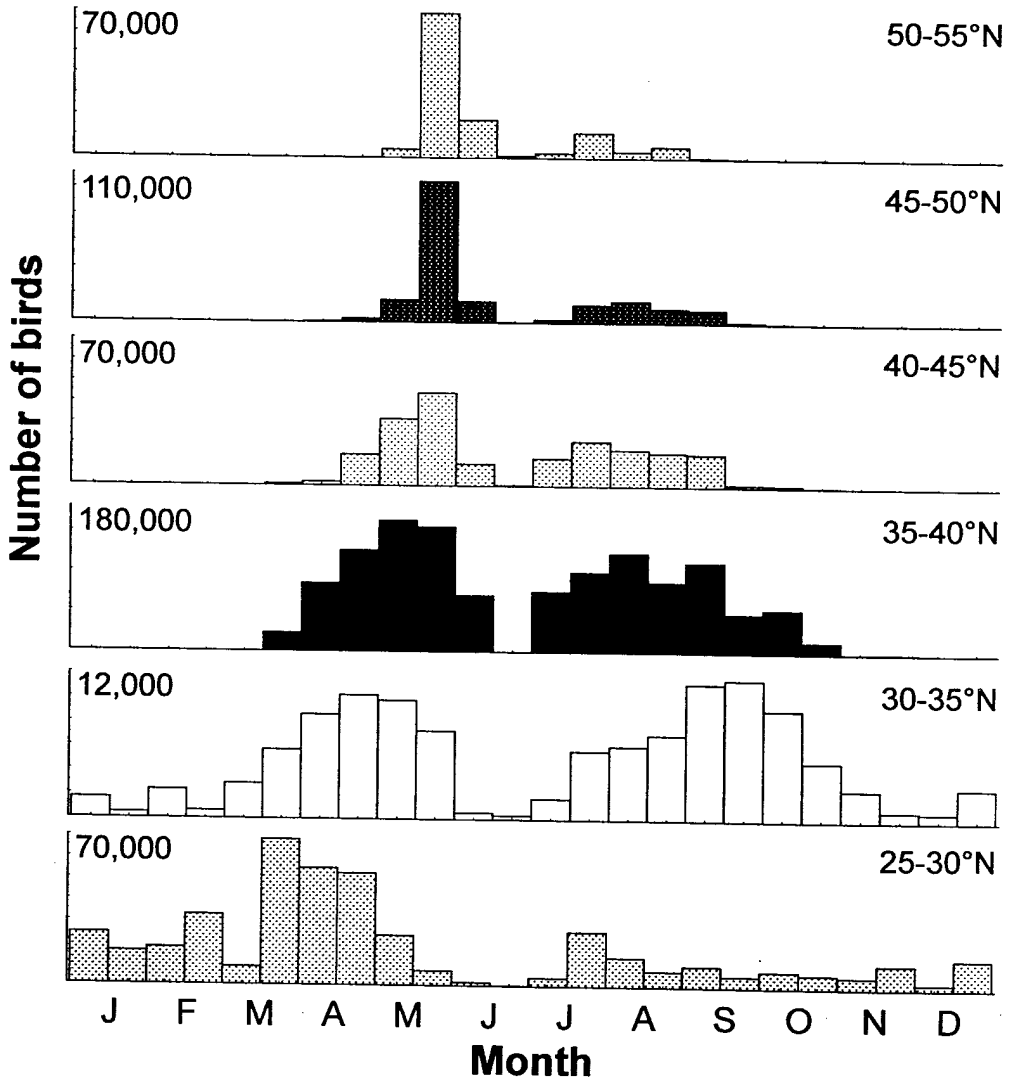
July-December

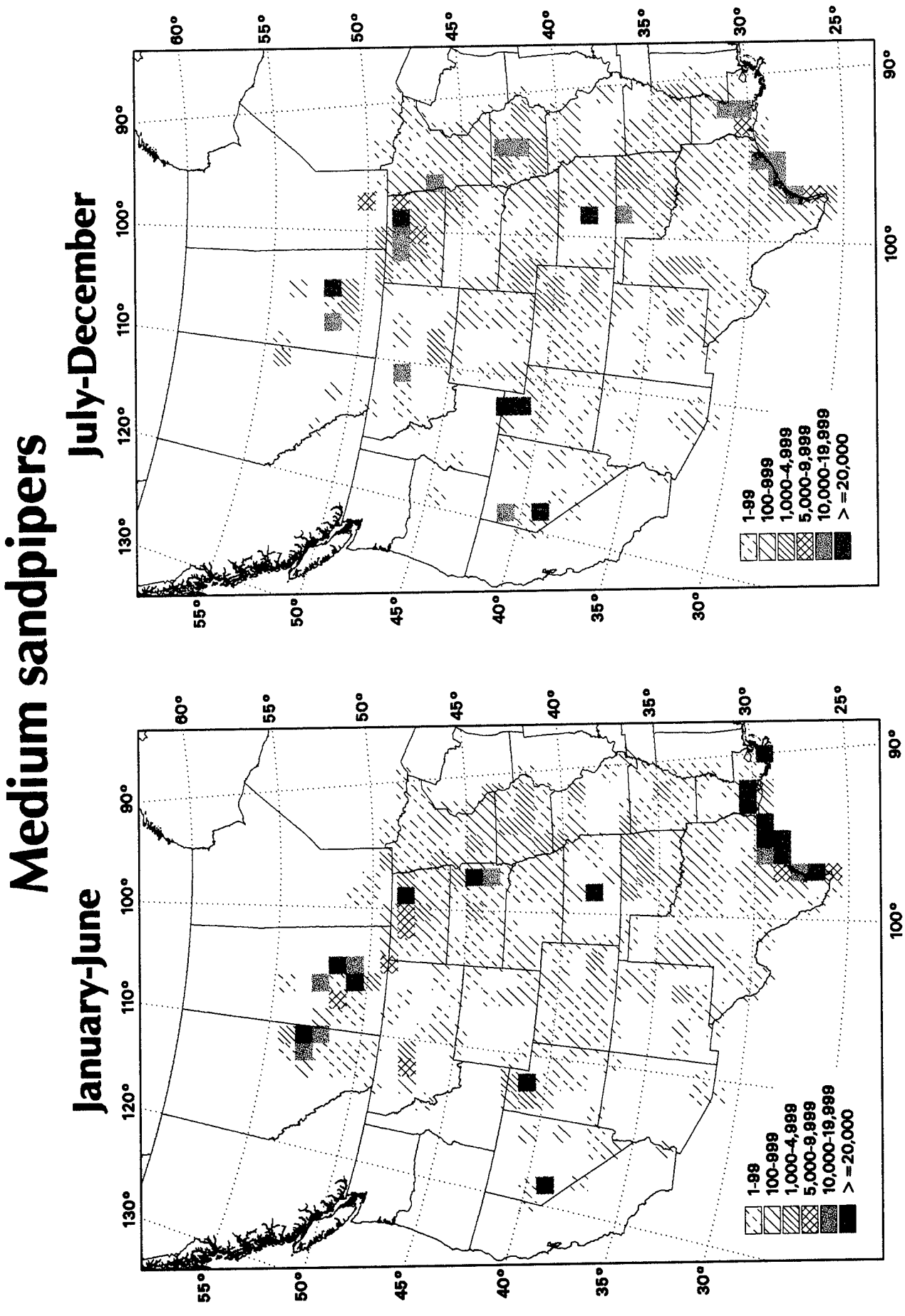


Small Sandpipers

Semipalmated Sandpiper
Western Sandpiper
Least Sandpiper
White-rumped Sandpiper
Baird's Sandpiper

Body Size: Small
Foraging Guild: Aquatic prober/gleaner
Foraging Habitat: Water depth - wet to 4/5 cm; vegetative cover - bare to sparse
Six sites with highest counts: (see Appendix for more information)
Cheyenne Bottoms Wildlife Management Area, Kansas
Laguna Atascosa National Wildlife Refuge, Texas
Minnewaukan Flats, Devil's Lake, North Dakota
Quill Lakes, Saskatchewan
Salt Plains National Wildlife Refuge, Oklahoma
Carson Lake, Nevada

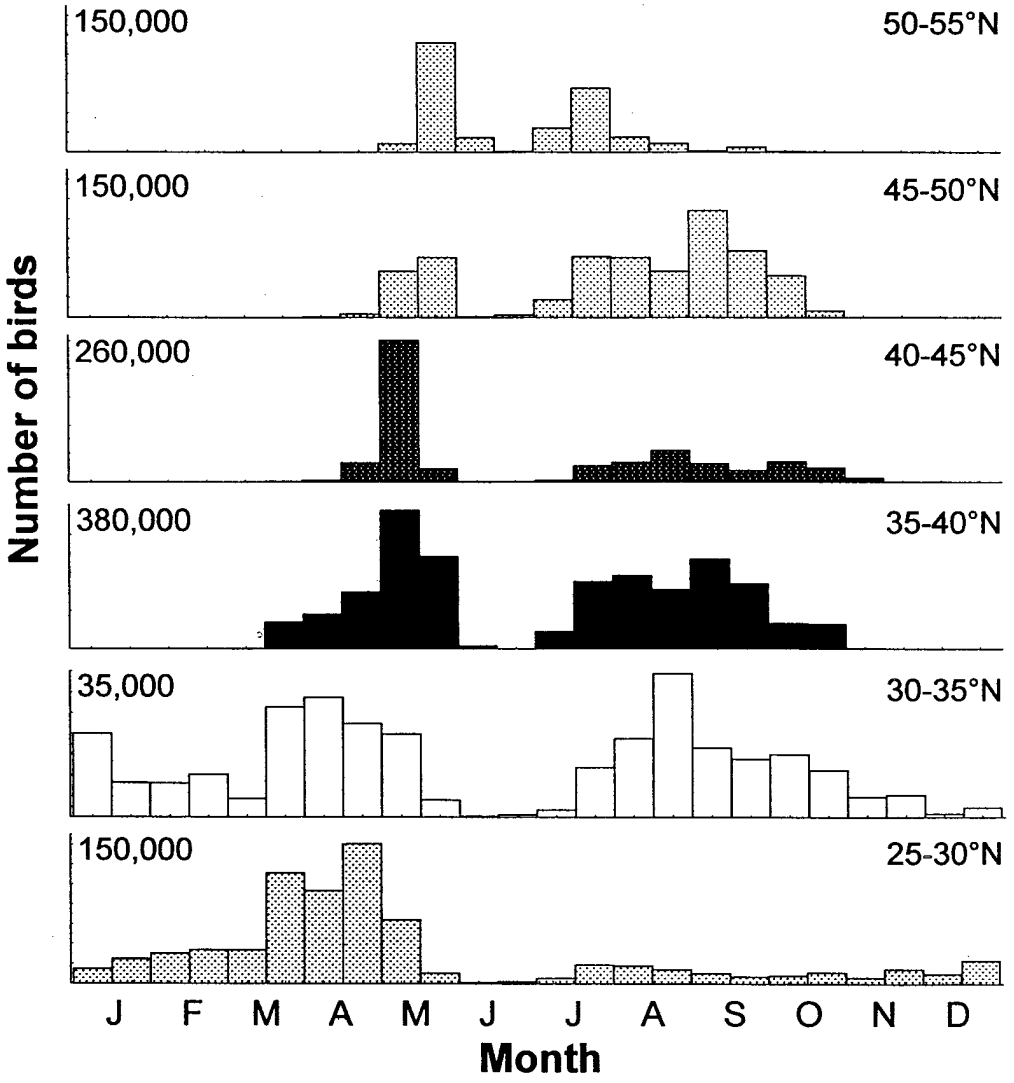



Medium sandpipers
January-June
July-December
1-99
100-999
1,000-4,999
5,000-9,999
10,000-19,999
> =20,000

Medium Sandpipers

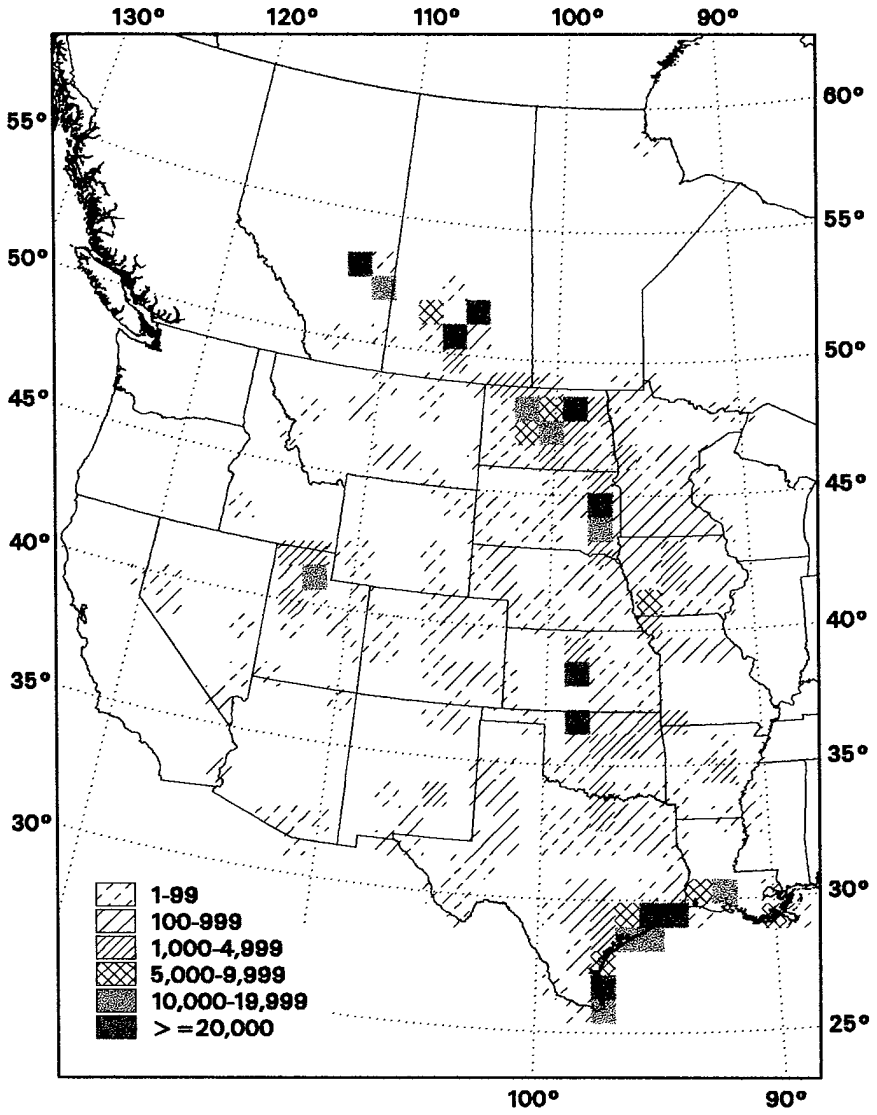
Greater Yellowlegs
Lesser Yellowlegs
Solitary Sandpiper
Spotted Sandpiper
Upland Sandpiper
Red Knot
Sanderling
Pectoral Sandpiper
Dunlin
Stilt Sandpiper
Buff-breasted Sandpiper
Short-billed Dowitcher
Long-billed Dowitcher

Body Size: Medium
Foraging Guild: Aquatic prober/gleaner
Foraging Habitat: Water depth - dry/wet to 3/12 cm; vegetative cover - bare to dense
Six sites with highest counts: (see Appendix for more information
Cheyenne Bottoms Wildlife Management Area, Kansas
Great Salt Lake area, Utah
Quill Lakes, Saskatchewan
Minnewaukan Flats, Devil's Lake, North Dakota
Lahontan Valley, Nevada, including Carson Lake and Stillwater National Wildlife Refuge
Laguna Atascosa National Wildlife Refuge, Texas

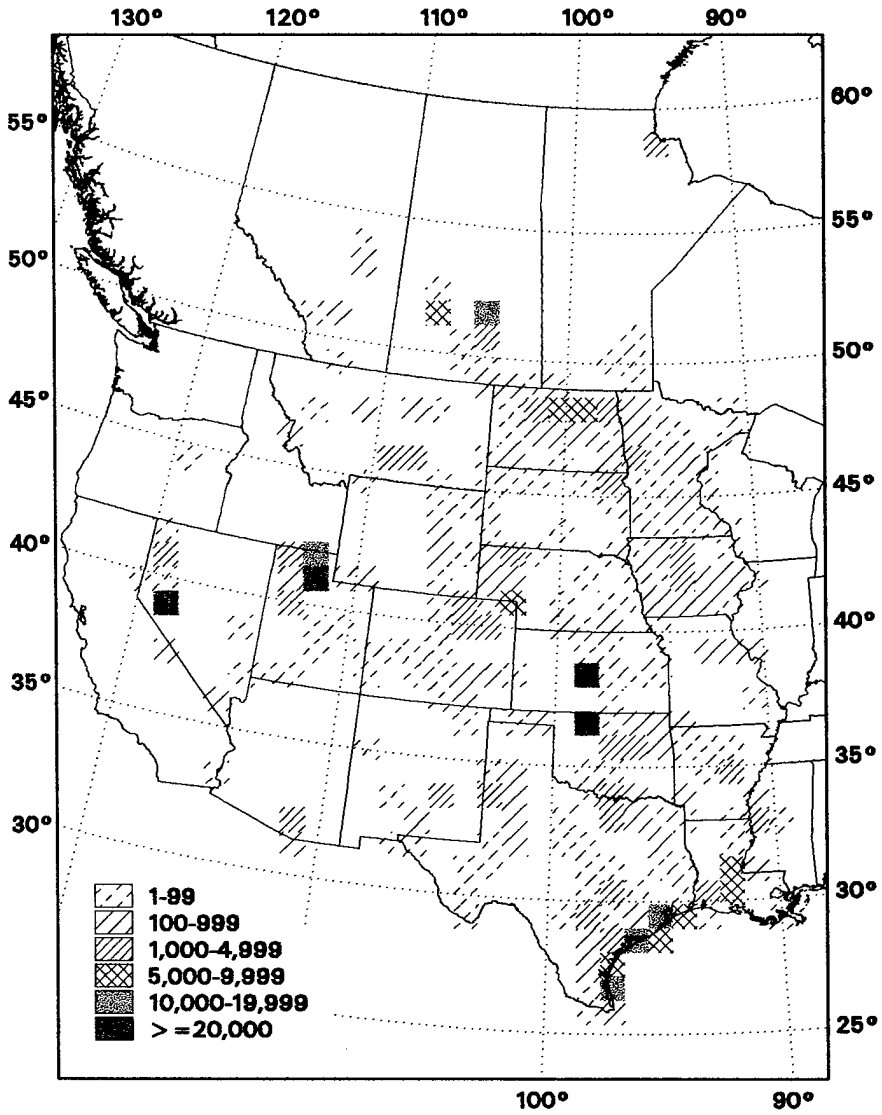


All small shorebirds

January-June



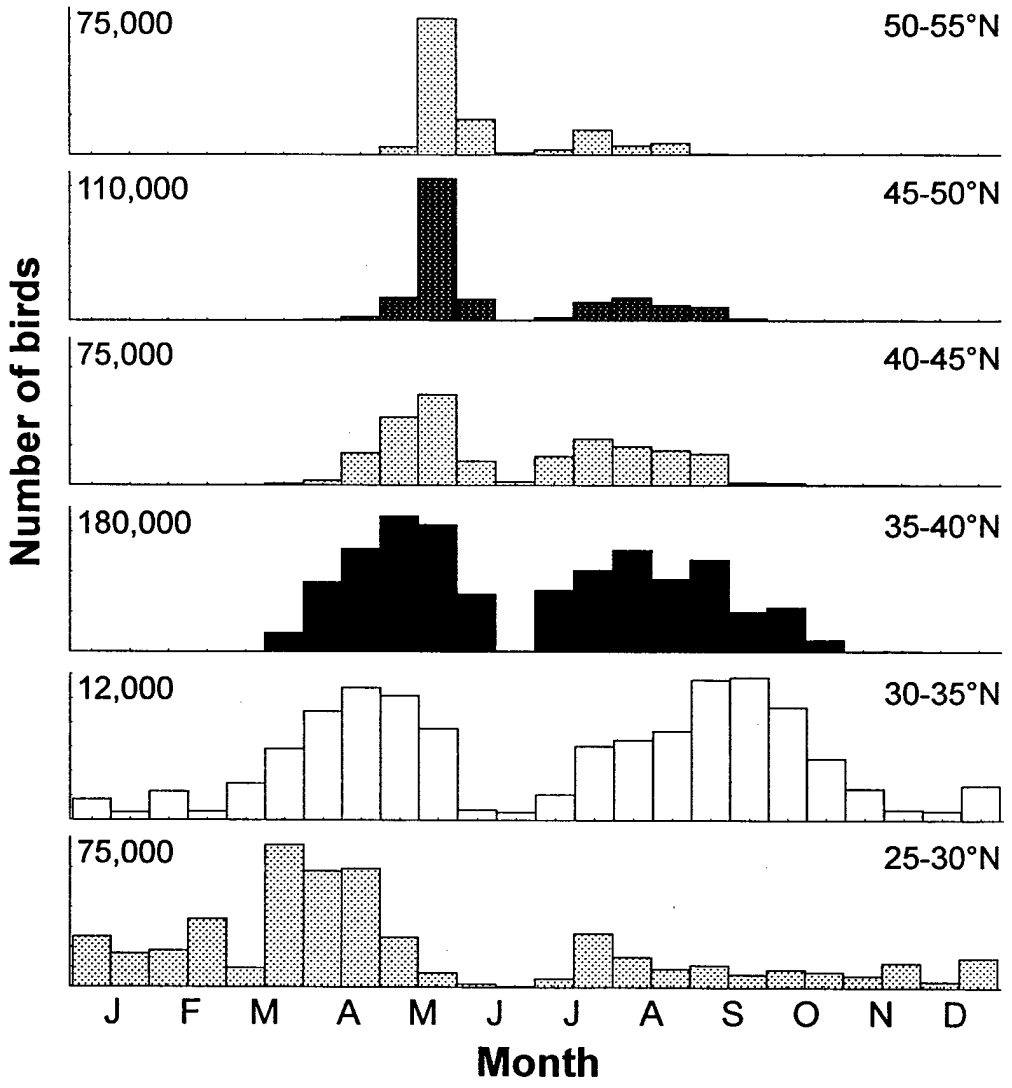
July-December

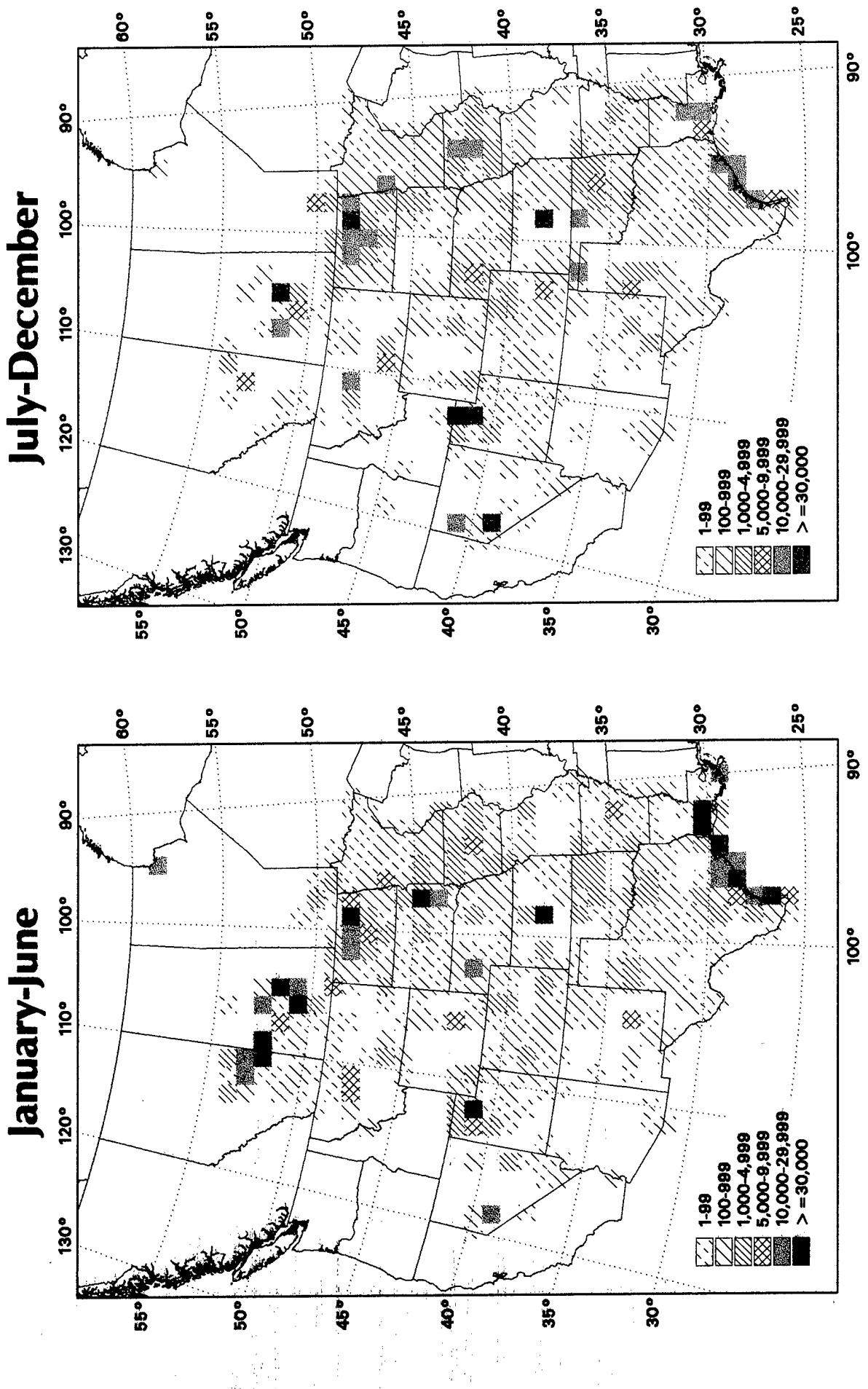


Small Shorebirds

Snowy Plover
Wilson's Plover
Semipalmated Plover
Piping Plover
Semipalmated Sandpiper
Western Sandpiper
Least Sandpiper
White-rumped Sandpiper
Baird's Sandpiper

Body Size: Small
Foraging Guild: Terrestrial/aquatic prober/gleaner
Foraging Habitat: Water depth - dry/wet to 3/5 cm; vegetative cover - bare to sparse
Six sites with highest counts: (see Appendix for more information)
Cheyenne Bottoms Wildlife Management Area, Kansas
Laguna Atascosa National Wildlife Refuge, Texas
Minnewaukan Flats, Devil's Lake, North Dakota
Quill Lakes, Saskatchewan
Salt Plains National Wildlife Refuge, Oklahoma
Carson Lake, Nevada

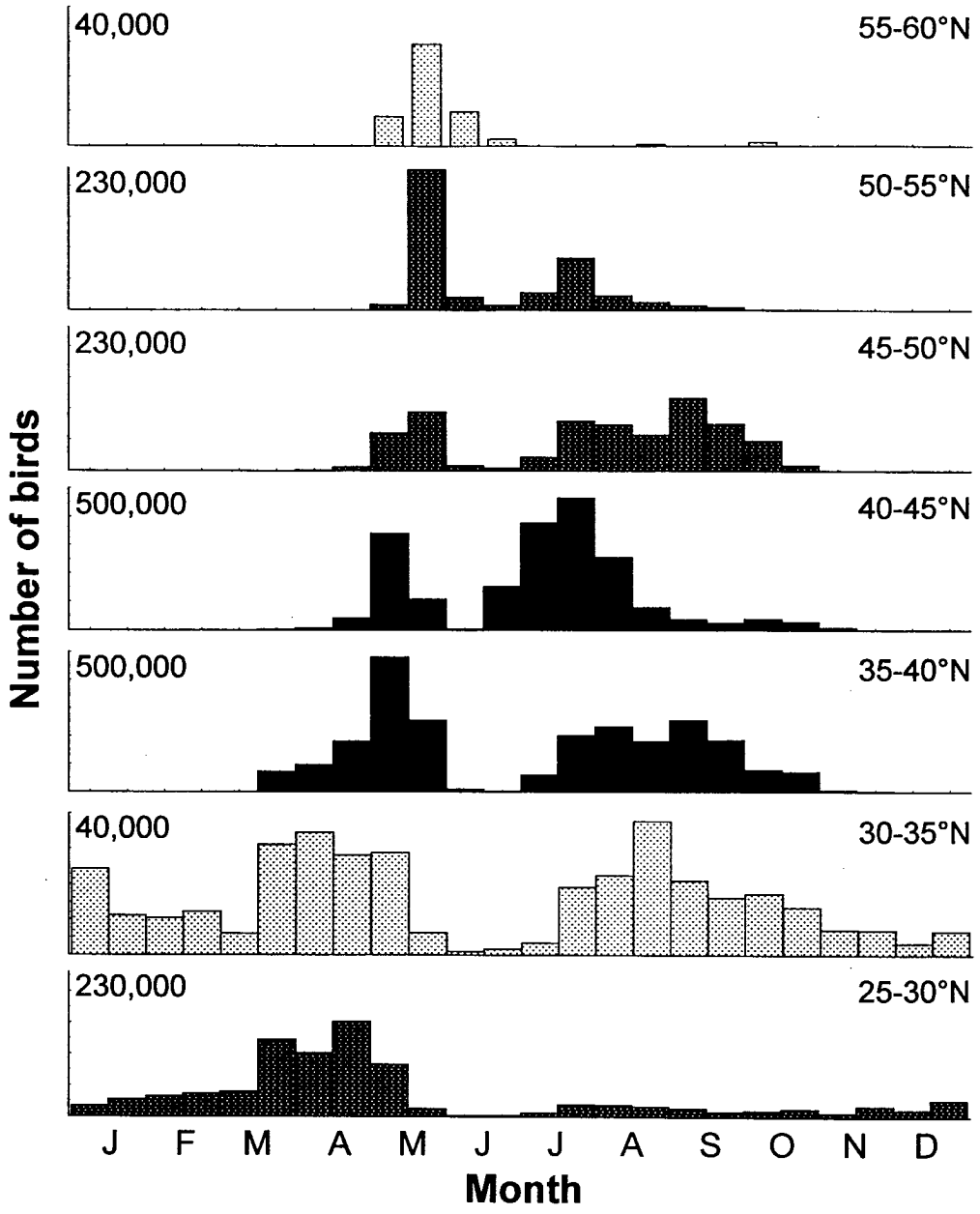


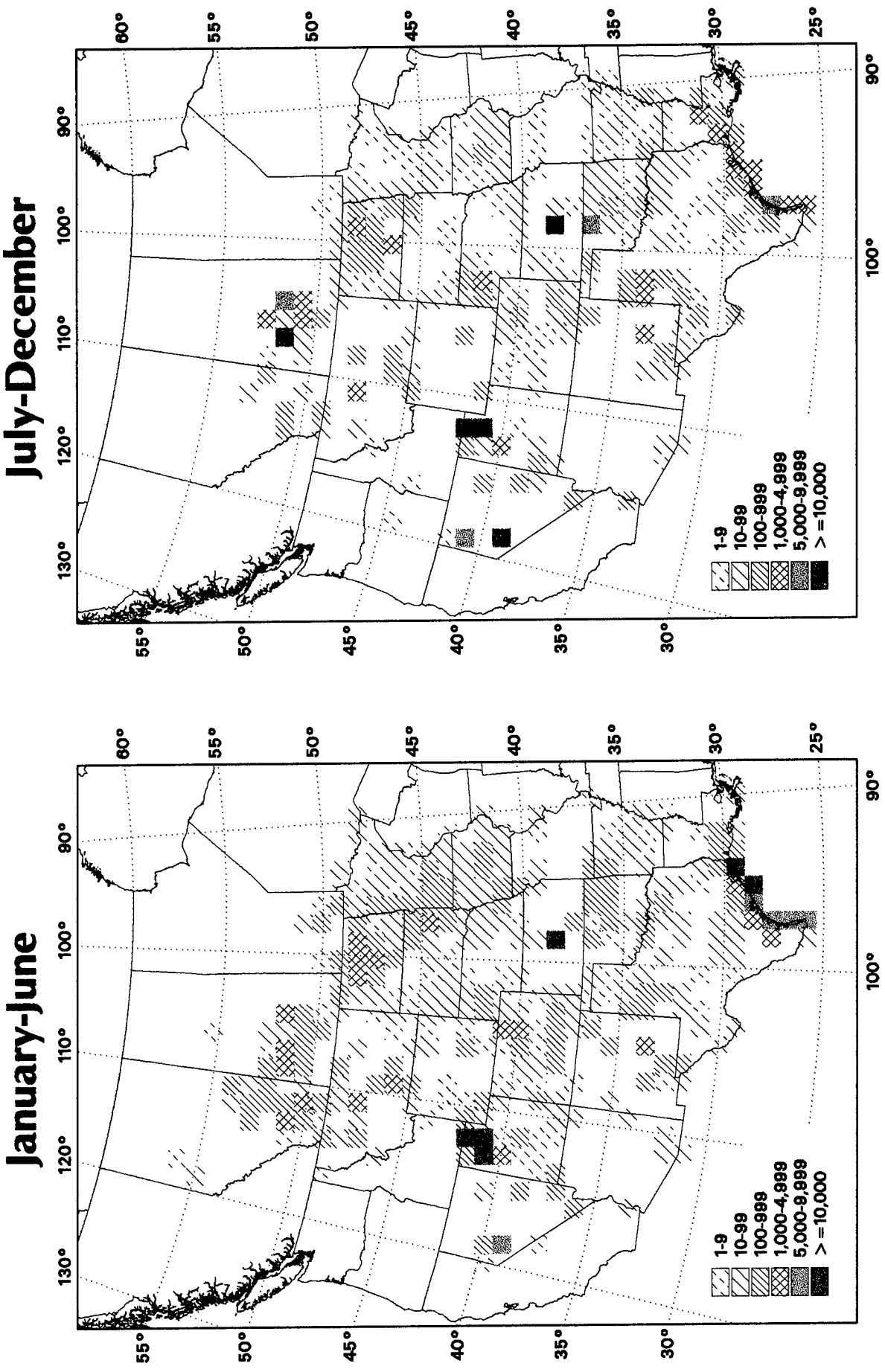

All medium shorebirds
January-June
July-December
1-99
100-999
1,000-4,999
5,000-9,999
10,000-29,999
> =30,000
60°
55°
50°
45°
40°
35°
30°
25°
130°
120°
110°
100°
90°

Medium Shorebirds

Black-bellied Plover
American Golden-Plover
Killdeer
Mountain Plover
Greater Yellowlegs
Lesser Yellowlegs
Solitary Sandpiper
Spotted Sandpiper
Ruddy Turnstone
Red Knot
Upland Sandpiper
Sanderling
Pectoral Sandpiper
Dunlin
Stilt Sandpiper
Buff-breasted Sandpiper
Short-billed Dowitcher
Long-billed Dowitcher
Common Snipe
Wilson's Phalarope
Red-necked Phalarope

Body Size: Medium
Foraging Guild: Terrestrial/aquatic prober/ gleaner/pelagic gleaner
Foraging Habitat: Water depth - dry/wet to 2/12/deep; vegetative cover - bare to dense
Six sites with highest counts: (see Appendix for more information)
Cheyenne Bottoms Wildlife Management Area, Kansas
Great Salt Lake area, Utah
Quill Lakes, Saskatchewan
Minnewaukan Flats, Devil's Lake, North Dakota
Lahontan Valley, Nevada, including Carson Lake and Stillwater National Wildlife Refuge
Laguna Atascosa National Wildlife Refuge, Texas

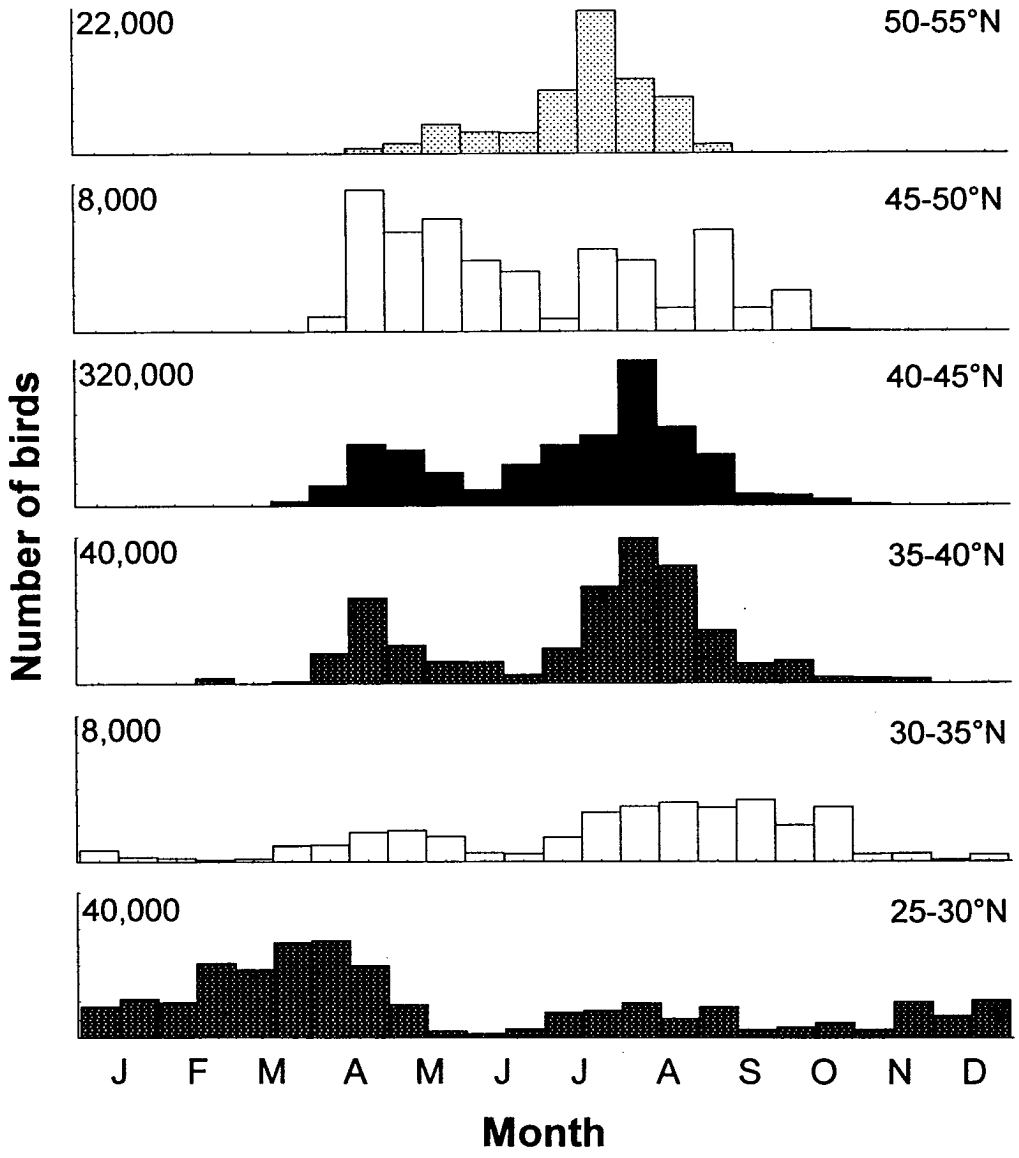


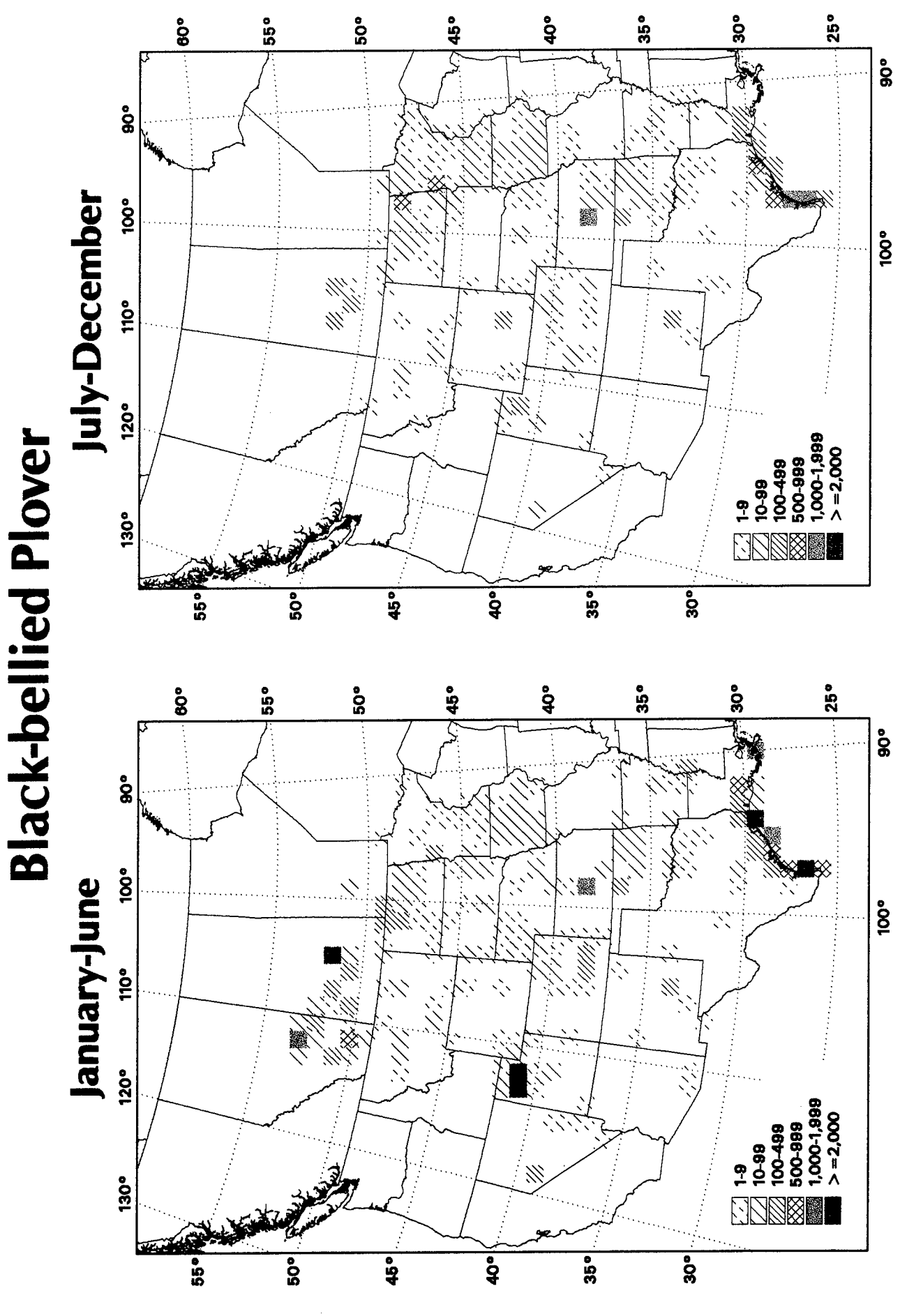

All large shorebirds
January-June
July-December
1-9
10-99
100-999
1,000-4,999
5,000-9,999
> = 10,000
60°
55°
50°
45°
40°
35°
30°
25°
130°
120°
110°
100°
90°

Large Shorebirds

Black-necked Stilt
American Avocet
Willet
Whimbrel
Long-billed Curlew
Hudsonian Godwit
Marbled Godwit

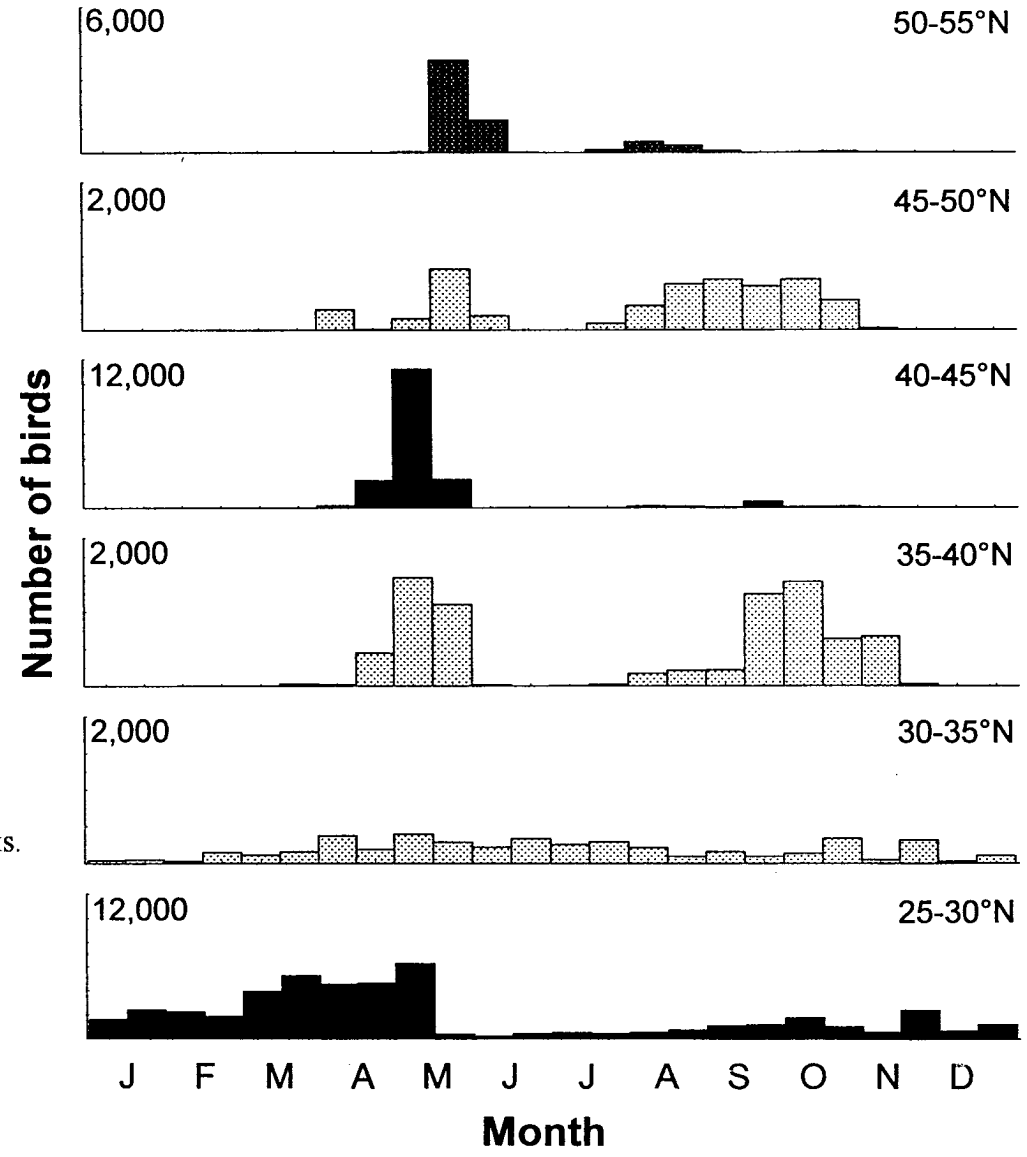
Body Size: Large
Foraging Guild: Terrestrial/aquatic prober/ gleaner/sweeper
Foraging Habitat: Water depth - dry/1cm to 9/20 cm; vegetative cover - bare to dense
Six sites with highest counts: (see Appendix for more information)
Great Salt Lake area, Utah
Lahontan Valley, Nevada, including Carson Lake and Stillwater National Wildlife Refuge
Bolivar Flats, Galveston Island, Texas
Cheyenne Bottoms Wildlife Management Area, Kansas
19 km west of Luck Lake, Saskatchewan
San Bernard National Wildlife Refuge, Texas

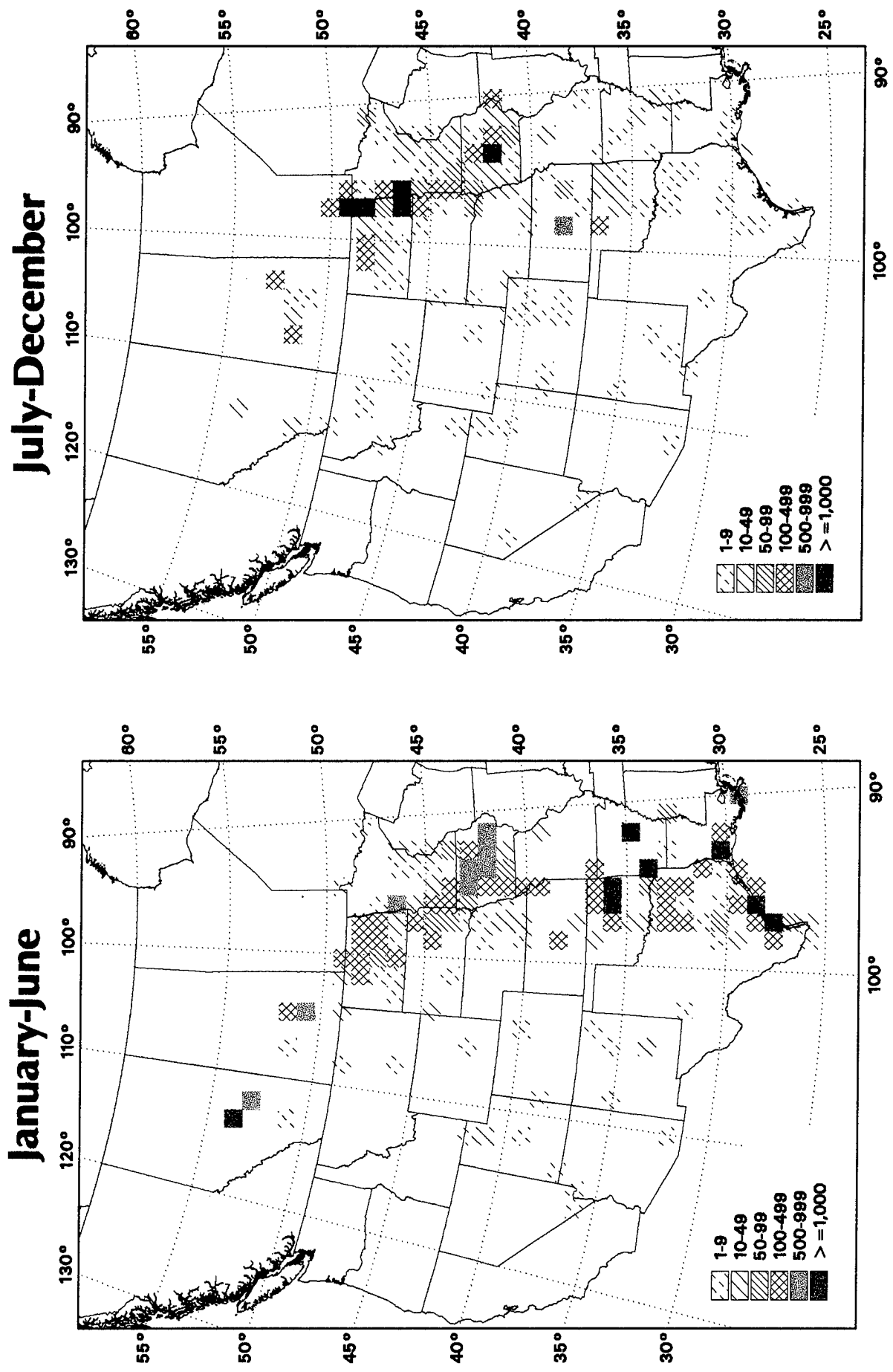



Black-bellied Plover
January-June
July-December
1-9
10-99
100-499
500-999
1,000-1,999
> =2,000
60°
55°
50°
45°
40°
35°
30°
25°
130°
120°
110°
100°
90°
80°

Black-bellied Plover *(Pluvialis squatarola)*

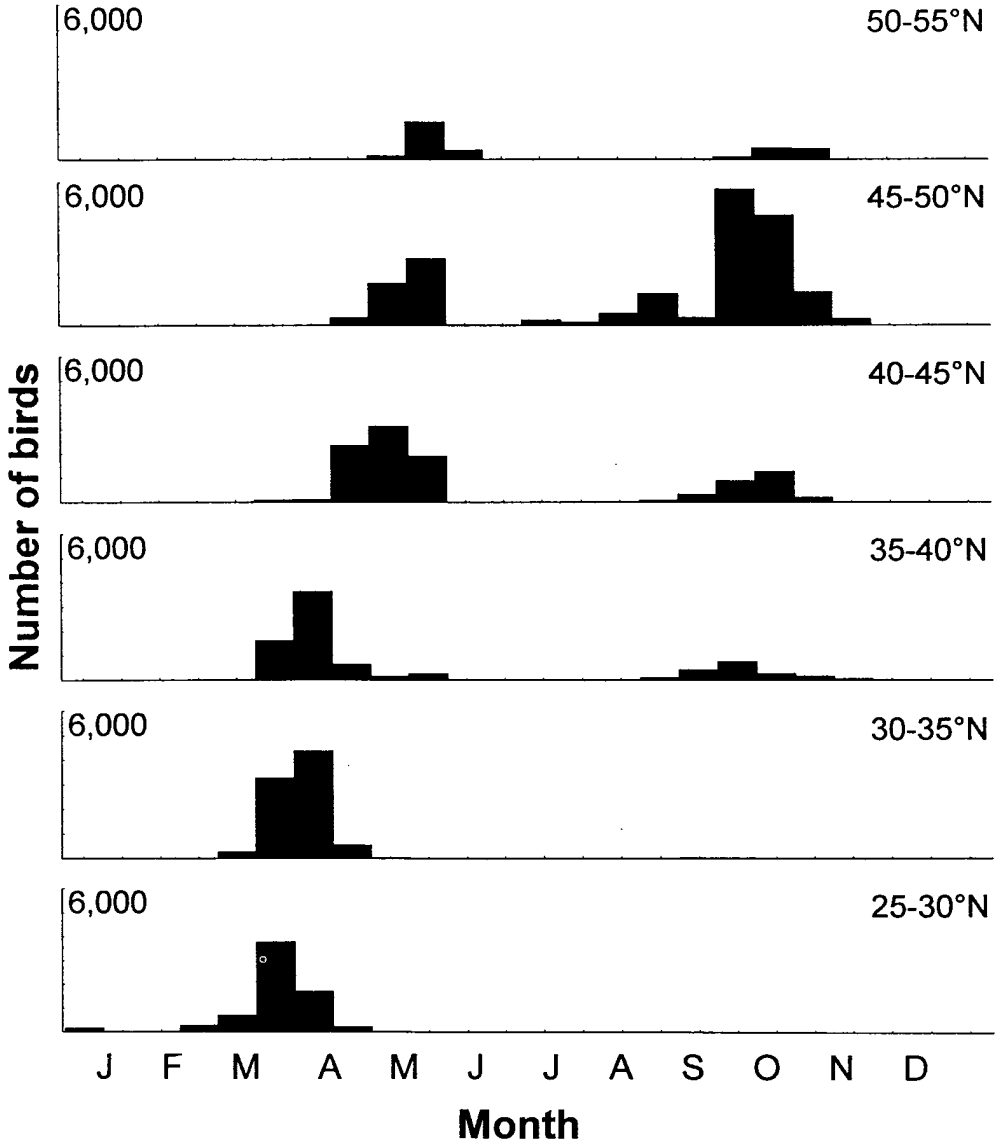
Body Size: Medium
Foraging Guild: Terrestrial/aquatic gleaner
Foraging Habitat: Water depth - wet to 10 cm; vegetative cover - bare to dense
Migration Distance: Intermediate
Migration Pattern: Widespread
Dispersion: Broadly dispersed; 60% of total maximum sightings occur in 10 spring and 14 fall 0.1° lat-long blocks.
Six sites with highest counts: (see Appendix for more information)
Great Salt Lake area, Utah
Laguna Atascosa National Wildlife Refuge, Texas
Quill Lakes, Saskatchewan
Grand Terre, Jefferson Parish, Louisiana
Bolivar Flats, Galveston Island, Texas
Beaverhill Lake, Alberta



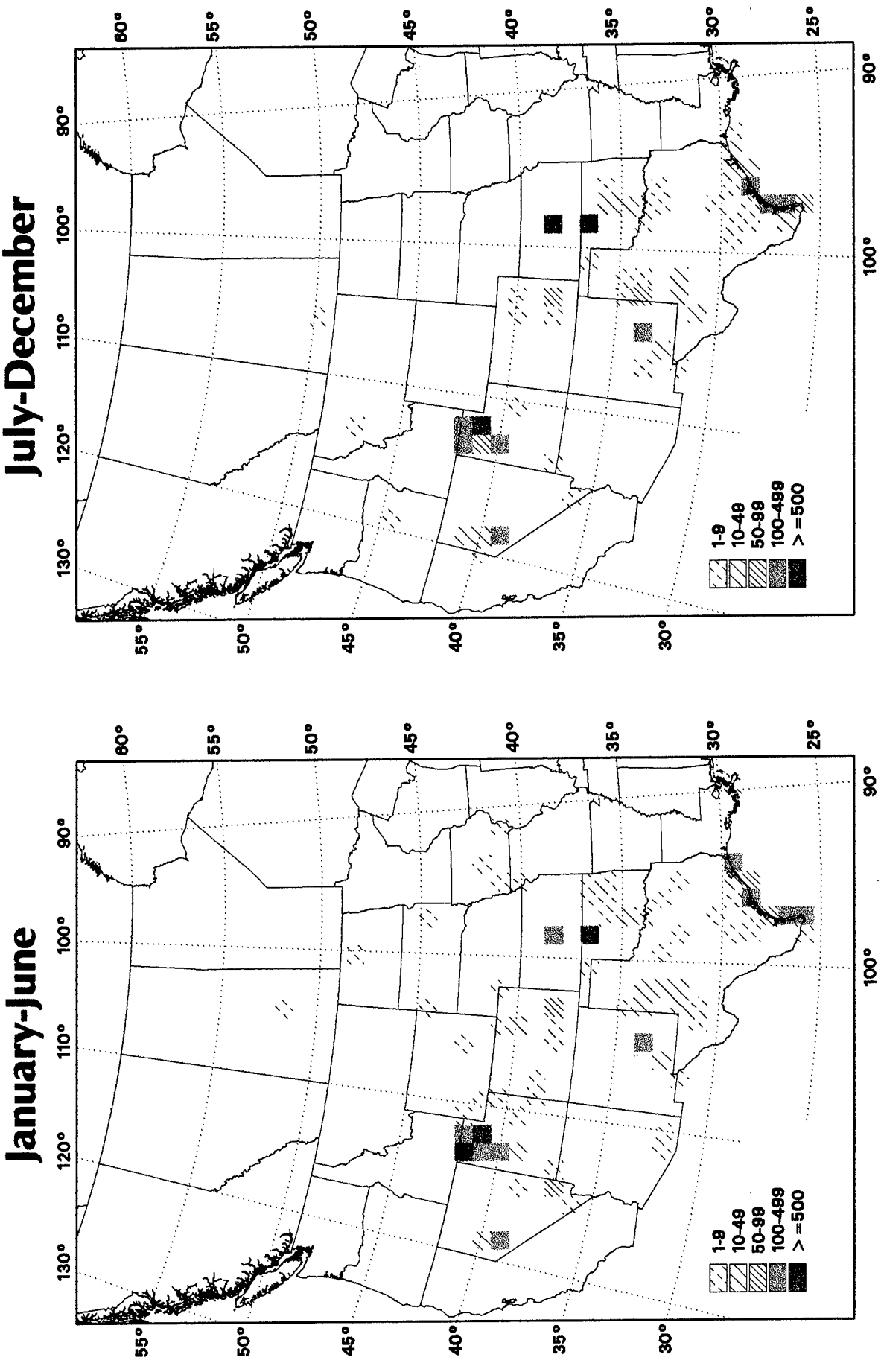

American Golden Plover
January-June
July-December
1-9
10-49
50-99
100-499
500-999
> =1,000
80°
55°
50°
45°
40°
35°
30°
25°
90°
100°
110°
120°
130°

American Golden-Plover *(Pluvialis dominica)*

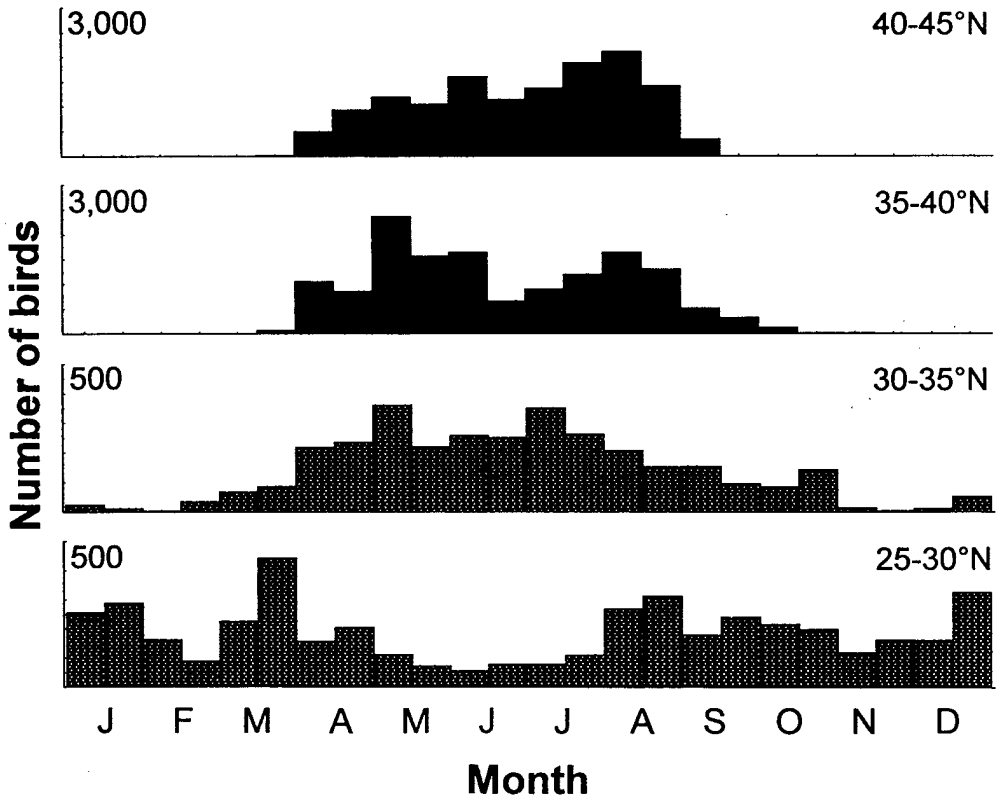
Body Size: Medium
Foraging Guild: Terrestrial/aquatic gleaner
Foraging Habitat: Water depth - dry to 8 cm; vegetative cover - bare to sparse
Migration Distance: Long
Migration Pattern: Narrow Band
Dispersion: Broadly to moderately dispersed; 60% of total maximum sightings occur in 27 spring and 7 fall 0.1° lat-long blocks.
Six sites with highest counts: (see Appendix for more information)
North Dakota State University, Fargo, North Dakota
Highway 108, Miller County, Arkansas
Rice fields, Cameron County, Louisiana
Spruce Grove, west of Edmonton, Alberta
Casselton, North Dakota
Jordan, Manitoba



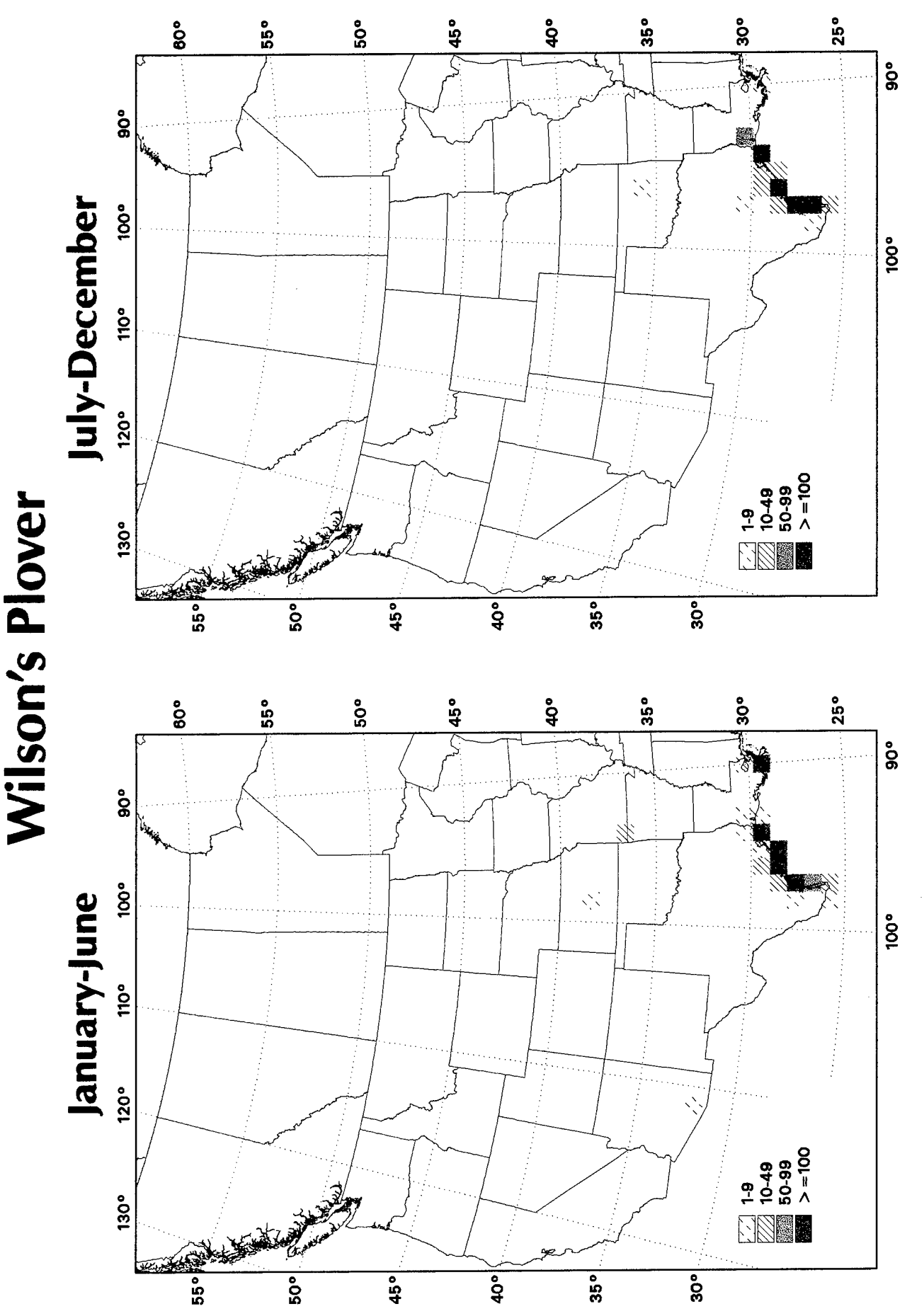
Snowy Plover



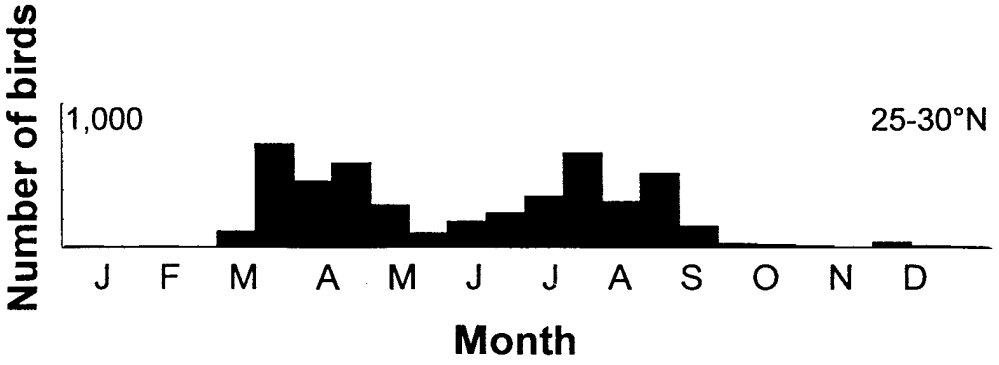
Snowy Plover *(Charadrius alexandrinus)*



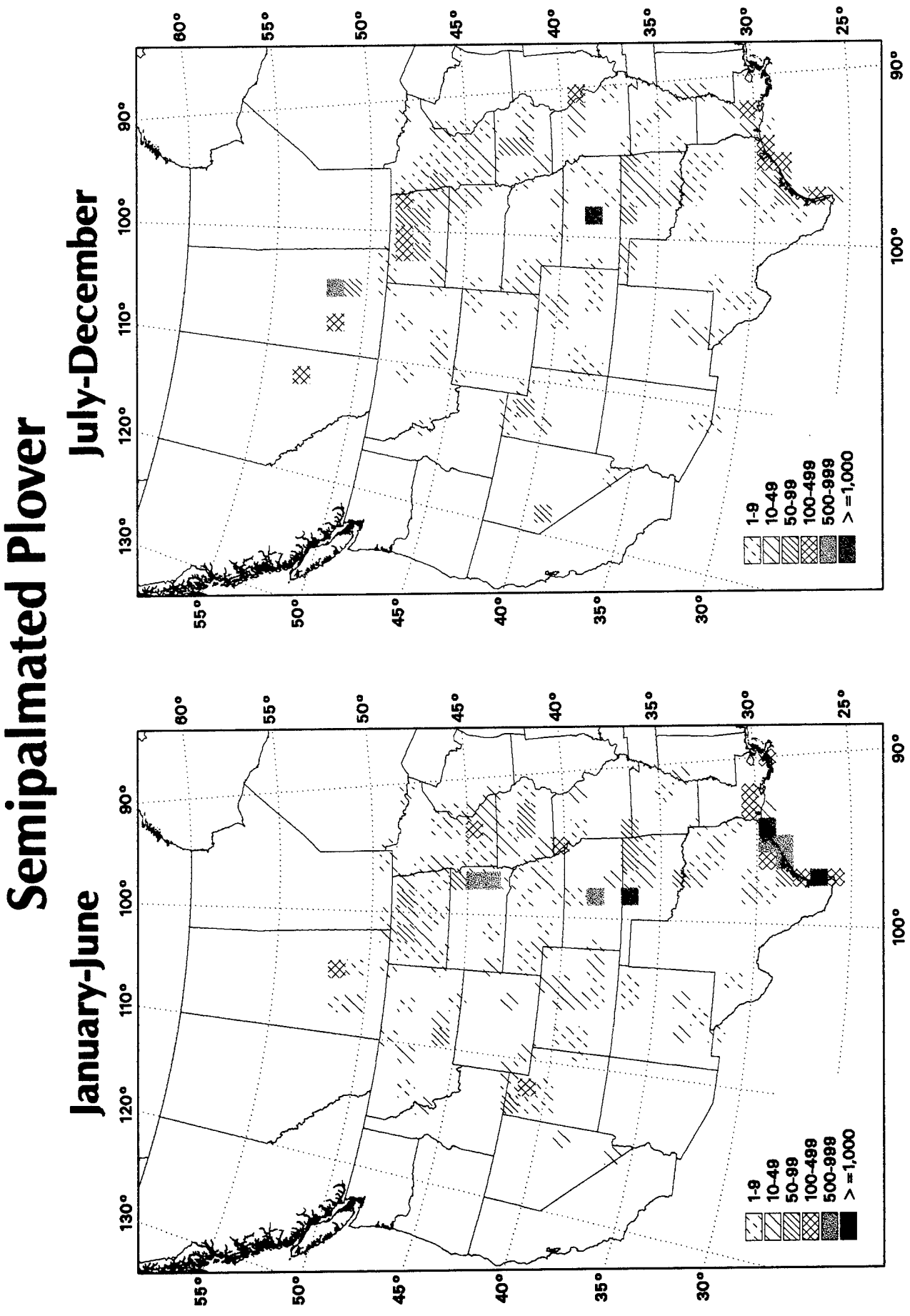
Body Size: Small
Foraging Guild: Terrestrial/aquatic gleaner
Foraging Habitat: Water depth - dry to 3 cm; vegetative cover - bare to sparse
Migration Distance: Short
Migration Pattern: Not assigned
Dispersion: Moderately dispersed; 60% of total maximum sightings occur in 8 spring and 9 fall 0.1° lat-long blocks.
Six sites with highest counts: (see Appendix for more information)
Salt Plains National Wildlife Refuge, Oklahoma
Great Salt Lake area, Utah
Stillwater National Wildlife Refuge, Nevada
Quivira National Wildlife Refuge, Kansas
Bitter Lake National Wildlife Refuge, New Mexico
Cheyenne Bottoms Wildlife Management Area, Kansas


Wilson's Plover
January-June
July-December
1-9
10-49
50-99
> = 100
60°
55°
50°
45°
40°
35°
30°
25°
130°
120°
110°
100°
90°

Wilson's Plover *(Charadrius wilsonia)*

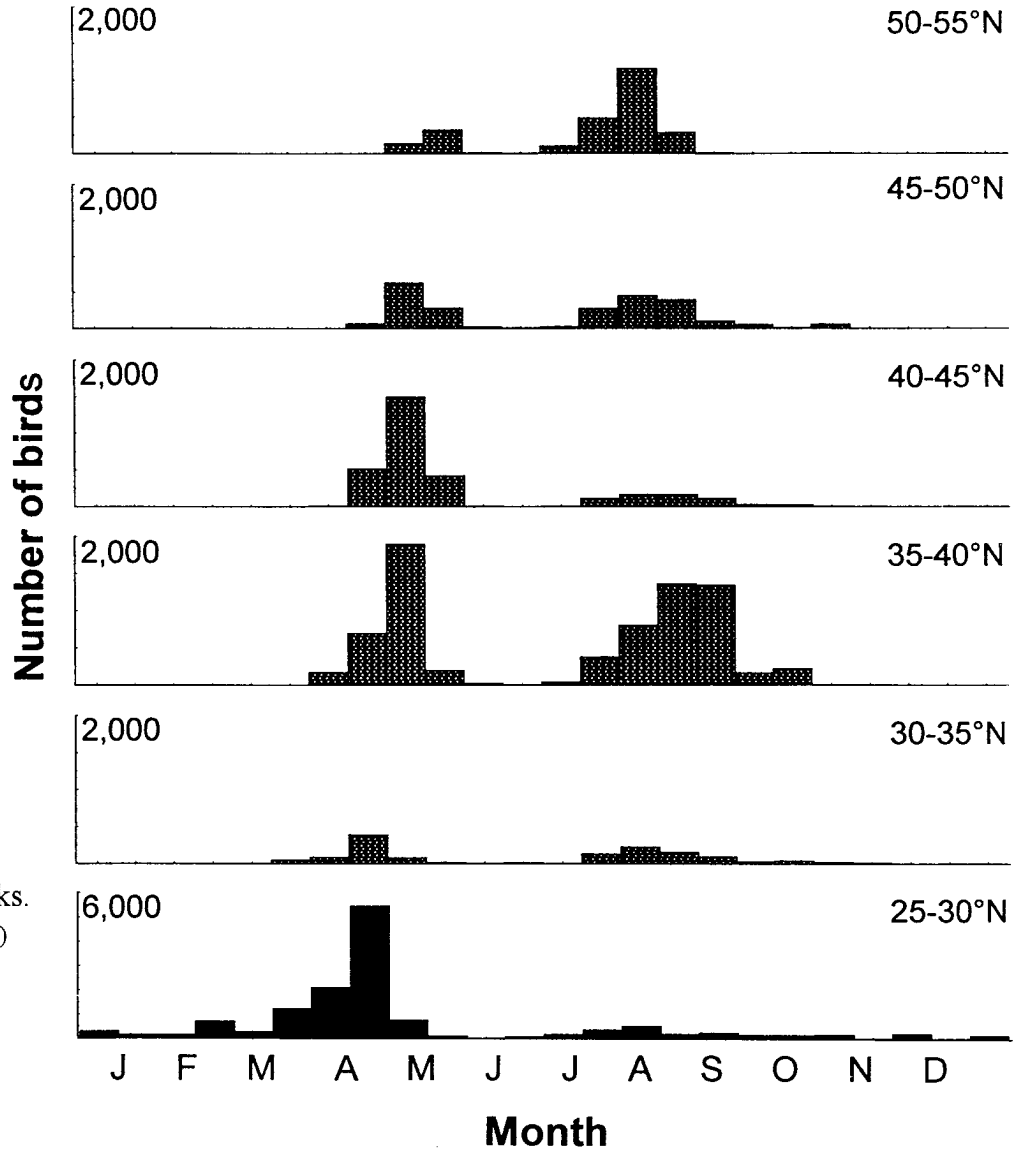


Body Size: Small
Foraging Guild: Terrestrial/aquatic gleaner
Foraging Habitat: Water depth - dry to 3 cm; vegetative cover - bare to sparse
Migration Distance: Short
Migration Pattern: Not assigned
Dispersion: Moderately dispersed; 60% of total maximum sightings occur in 5 spring and 4 fall 0.1° lat-long blocks.
Six sites with highest counts: (see Appendix for more information)
Padre Island National Seashore, Texas
San Luis Pass, Galveston Island, Texas
Laguna Atascosa National Wildlife Refuge, Texas
Bolivar Flats, Galveston Island, Texas
Matagorda National Wildlife Refuge, Texas
Airport, Port Aransas, Texas

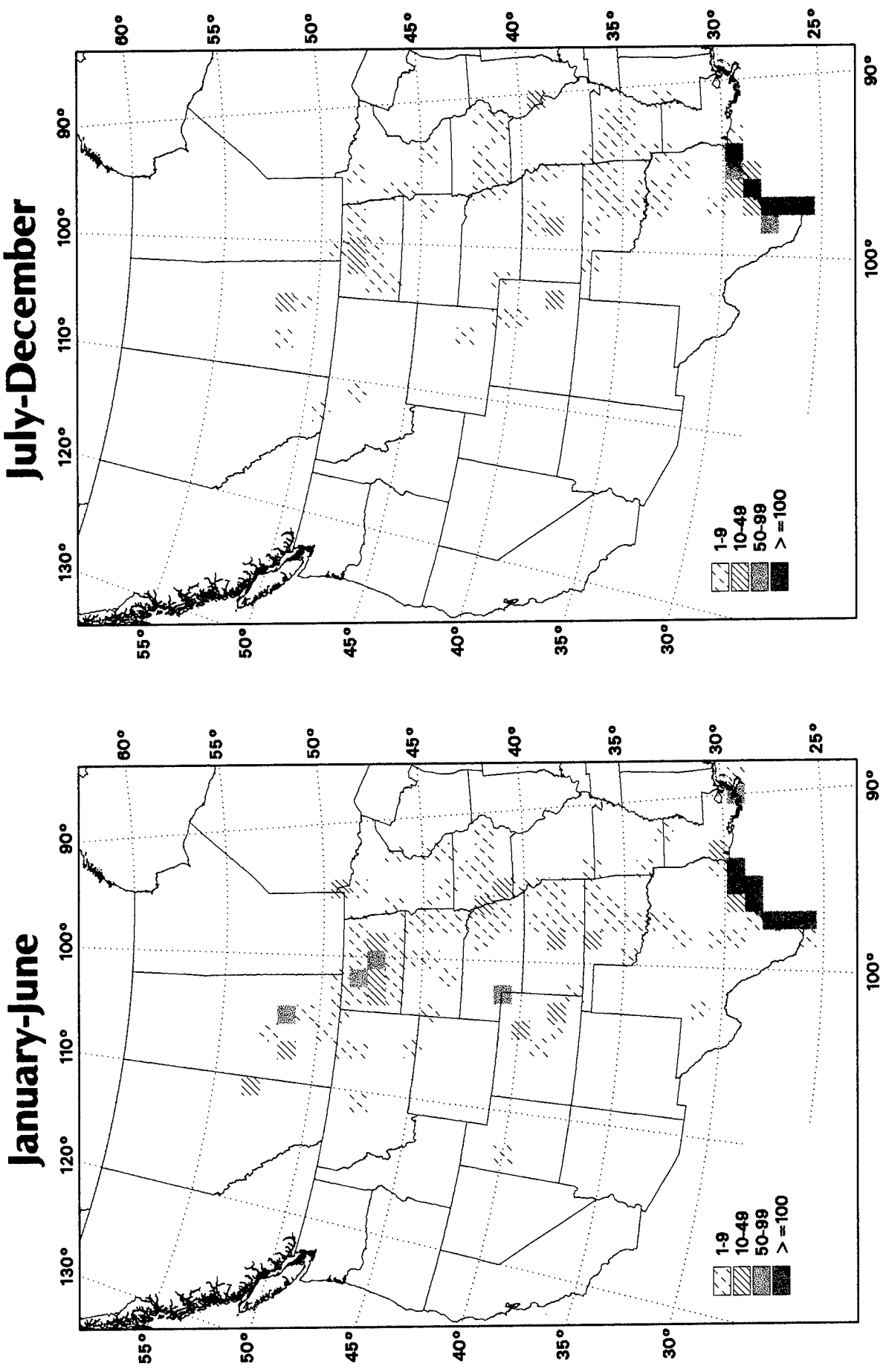

Semipalmated Plover
January-June
July-December
1-9
10-49
50-99
100-499
500-999
> =1,000
60°
55°
50°
45°
40°
35°
30°
25°
130°
120°
110°
100°
90°

Semipalmated Plover ***(Charadrius semipalmatus)***

Body Size: Small
Foraging Guild: Terrestrial/aquatic gleaner
Foraging Habitat: Water depth - wet to 3 cm; vegetative cover - bare to sparse
Migration Distance: Intermediate
Migration Pattern: Narrow Band
Dispersion: Broadly dispersed; 60% of total maximum sightings occur in 13 spring and 11 fall 0.1° lat-long blocks.
Six sites with highest counts: (see Appendix for more information)
Chambers County, Texas
Laguna Atascosa National Wildlife Refuge, Texas
Cheyenne Bottoms Wildlife Management Area, Kansas
Salt Plains National Wildlife Refuge, Oklahoma
Brazoria National Wildlife Refuge, Texas
Quill Lakes, Saskatchewan

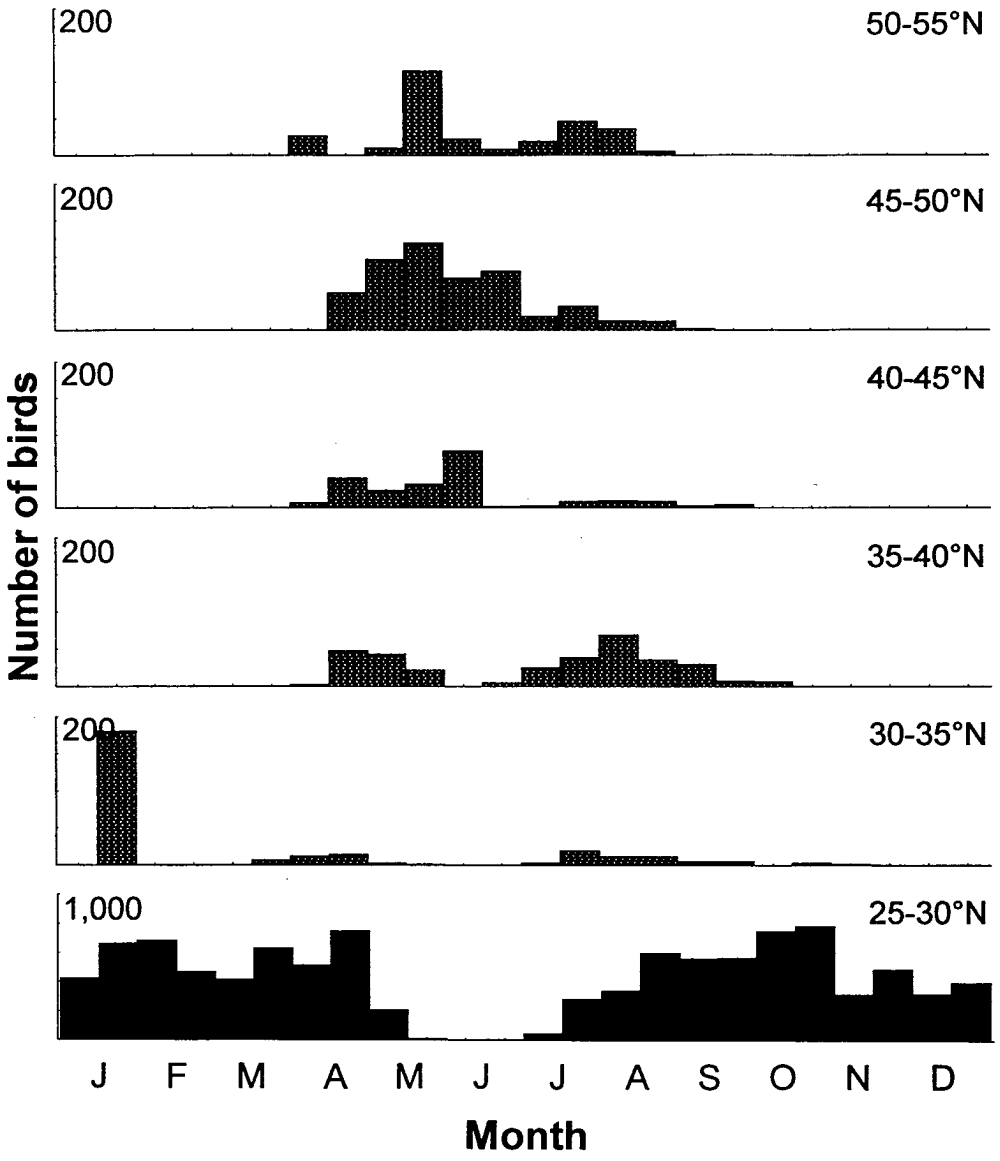


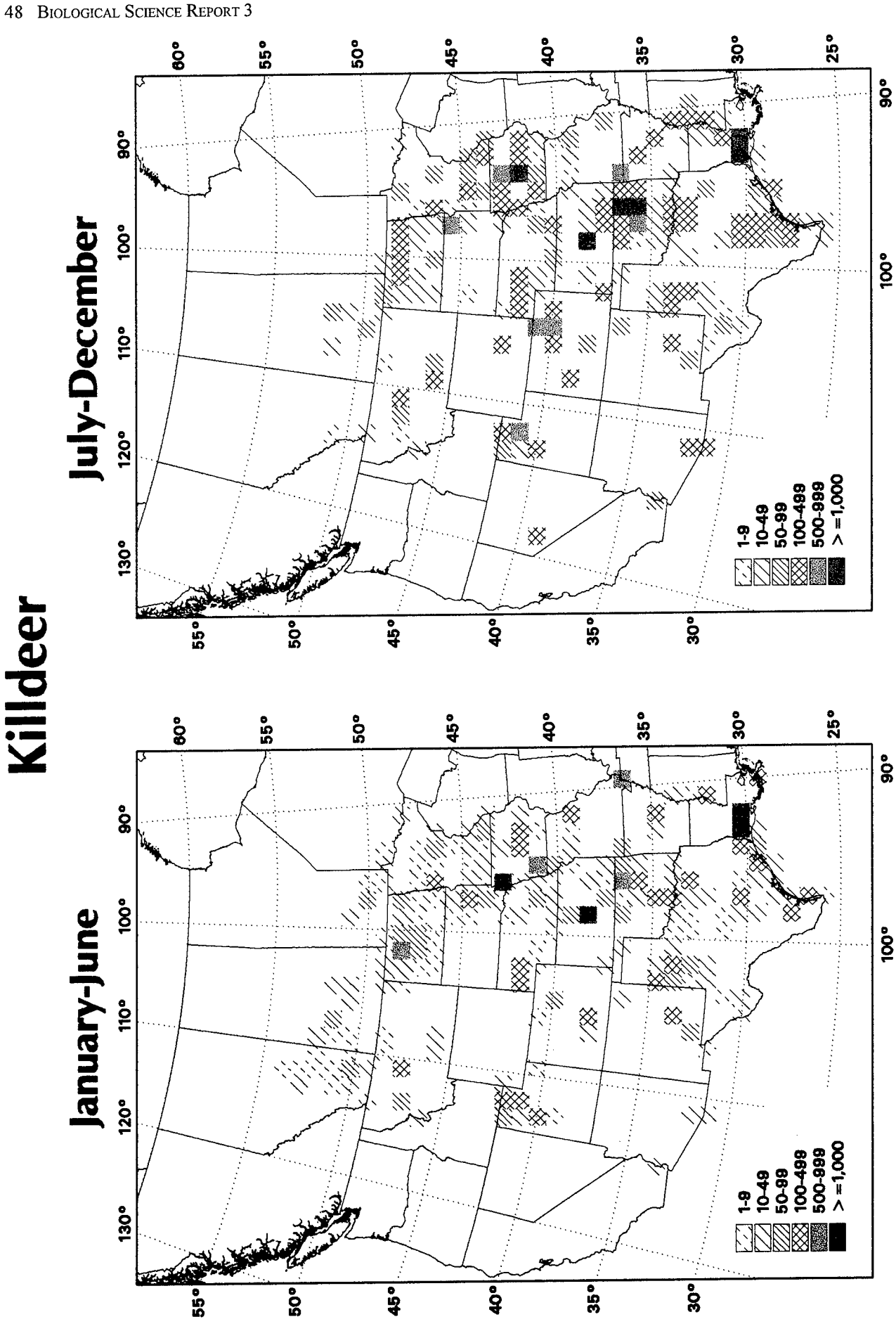
Piping Plover



Piping Plover *(Charadrius melodus)*

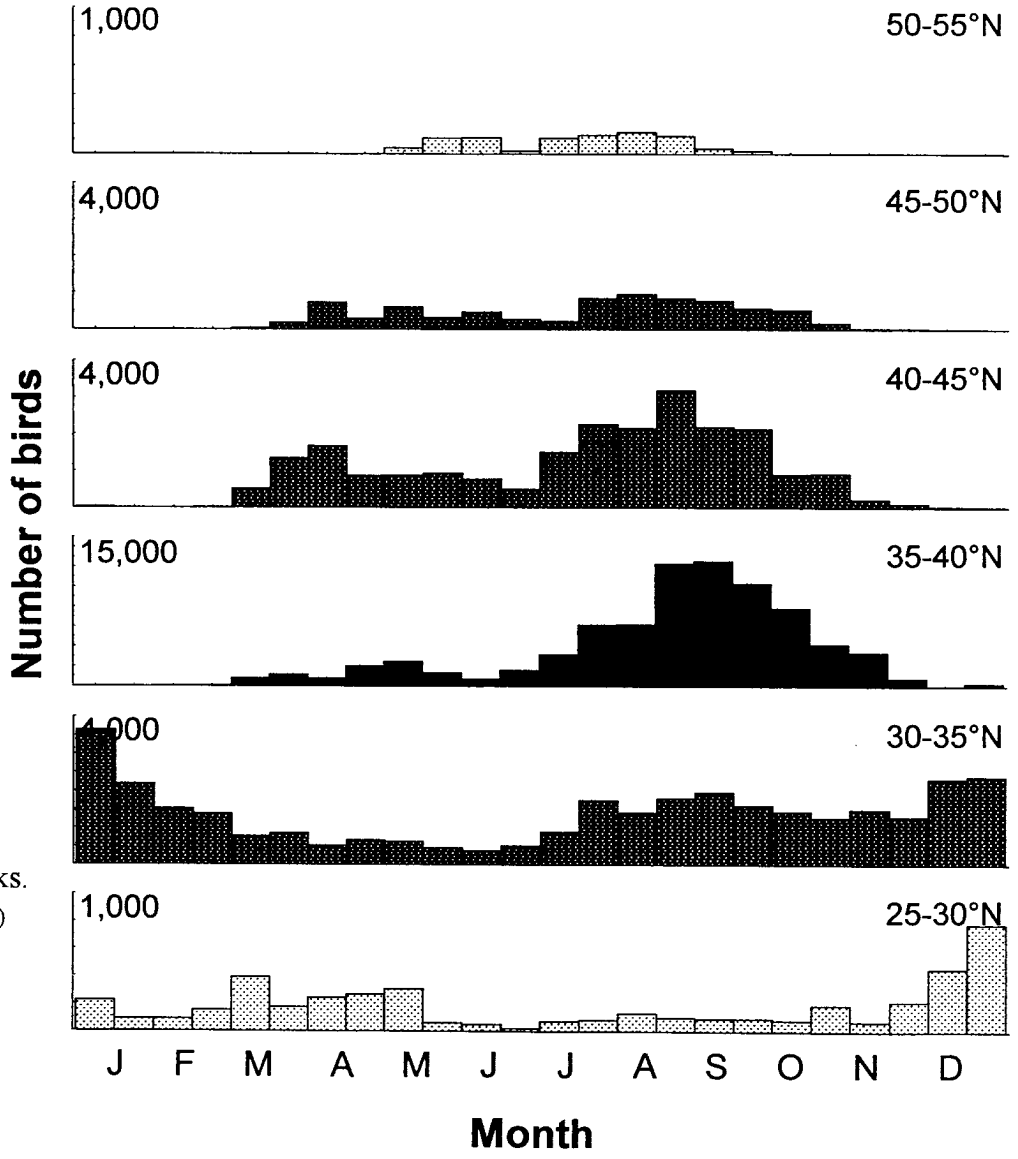
Body Size: Small
Foraging Guild: Terrestrial/aquatic gleaner
Foraging Habitat: Water depth - dry to 3 cm; vegetative cover - bare to sparse
Migration Distance: Short
Migration Pattern: Narrow Band
Dispersion: Broadly to moderately dispersed; 60% of total maximum sightings occur in 10 spring and 8 fall 0.1° lat-long blocks.
Six sites with highest counts: (see Appendix for more information)
Matagorda National Wildlife Refuge, Texas
Bolivar Flats, Galveston Island, Texas
South Padre Island, Texas
Padre Island National Seashore, Texas
San Luis Pass, Galveston Island, Texas
Airport, Port Aransas, Texas

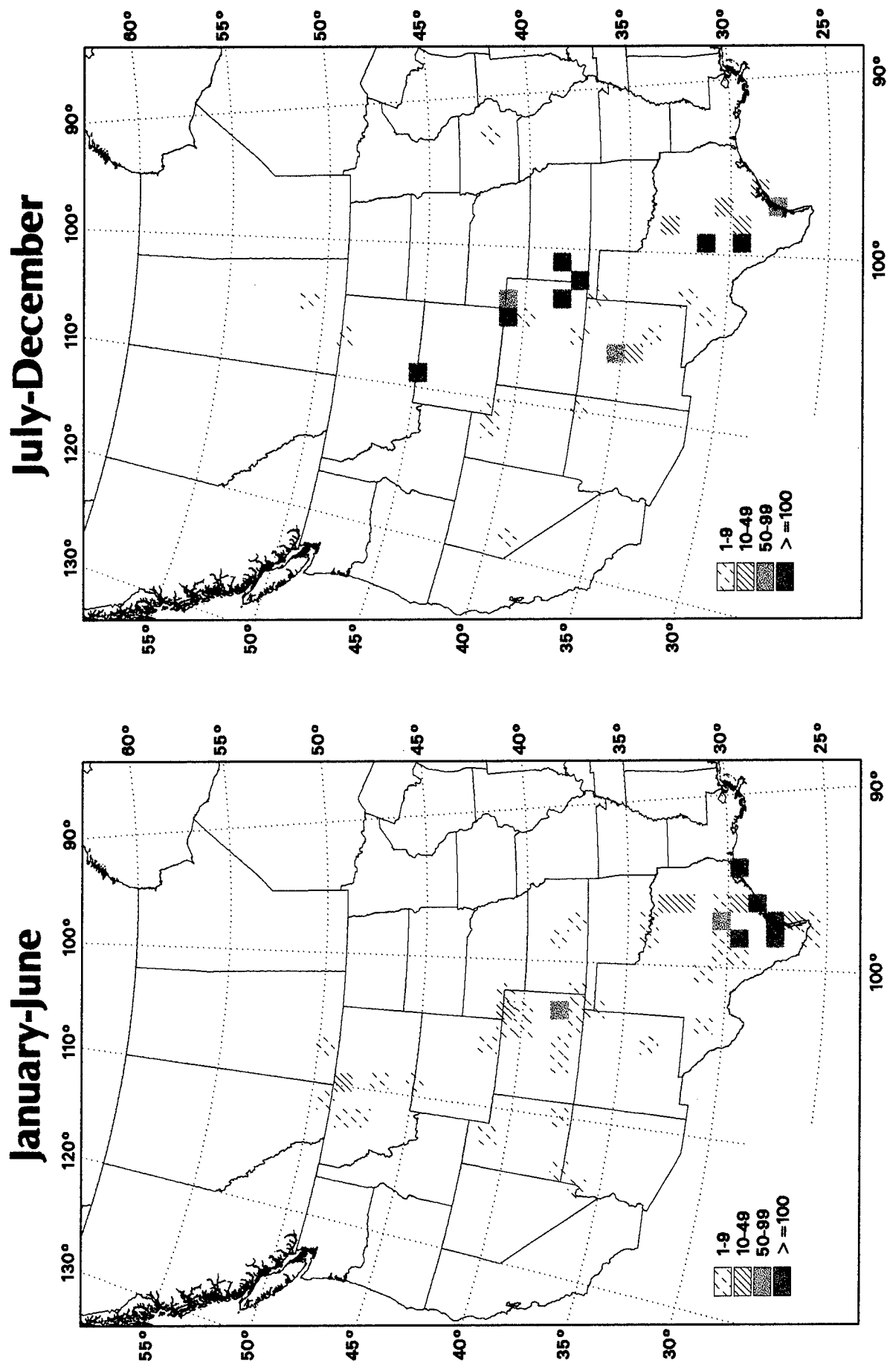



Killdeer
January-June
July-December
1-9
10-49
50-99
100-499
500-999
> =1,000
60°
55°
50°
45°
40°
35°
30°
25°
90°
100°
110°
120°
130°

Killdeer *(Charadrius vociferus)*

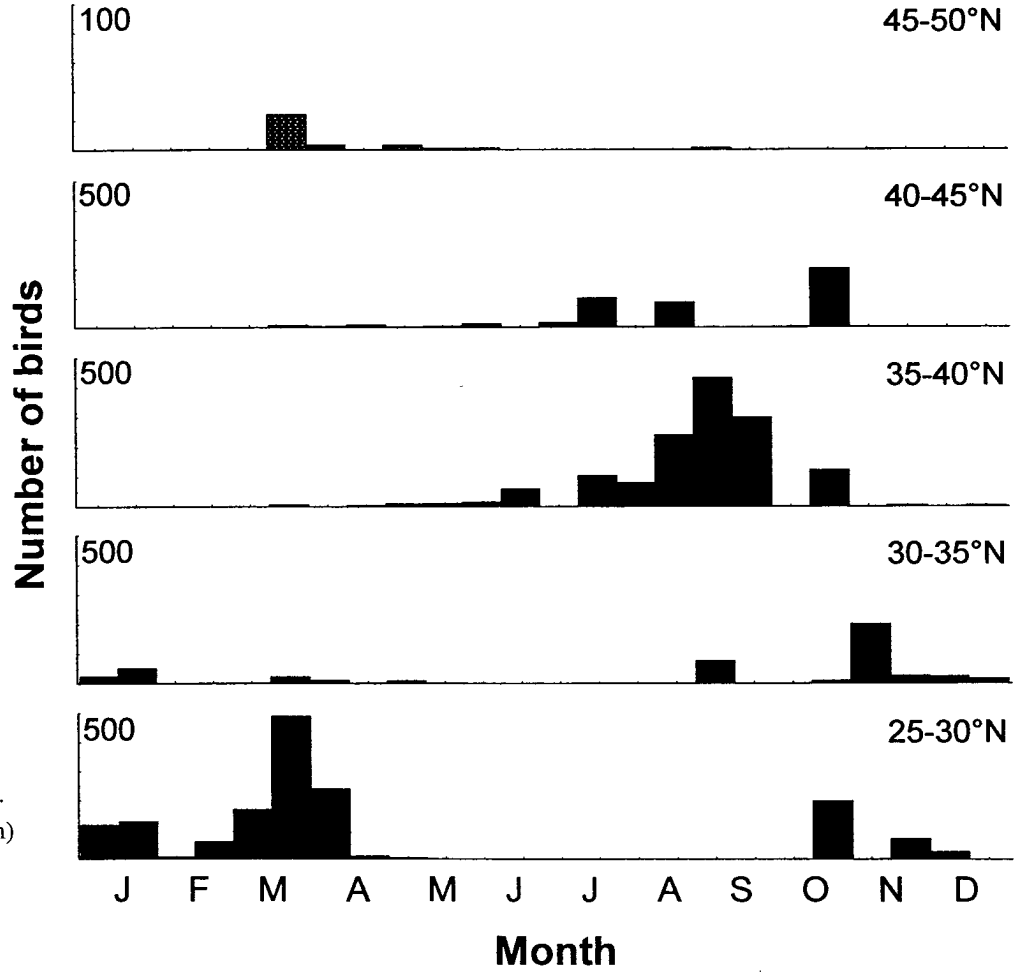
Body Size: Medium
Foraging Guild: Terrestrial/aquatic gleaner
Foraging Habitat: Water depth - dry to 3 cm; vegetative cover - bare to dense
Migration Distance: Short
Migration Pattern: Widespread
Dispersion: Broadly dispersed; 60% of total maximum sightings occur in 19 spring and 32 fall 0.1° lat-long blocks.
Six sites with highest counts: (see Appendix for more information)
Cheyenne Bottoms Wildlife Management Area, Kansas
Between Duson and Crowley, Louisiana
Between Jennings and Welsh, Louisiana
Doon, Lyon County, Iowa
Mohawk Park, Tulsa, Oklahoma
Coweta sod farms, Wagoner County, Oklahoma




Mountain Plover
January-June
July-December
1-9
10-49
50-99
> =100
60°
55°
50°
45°
40°
35°
30°
25°
130°
120°
110°
100°
90°

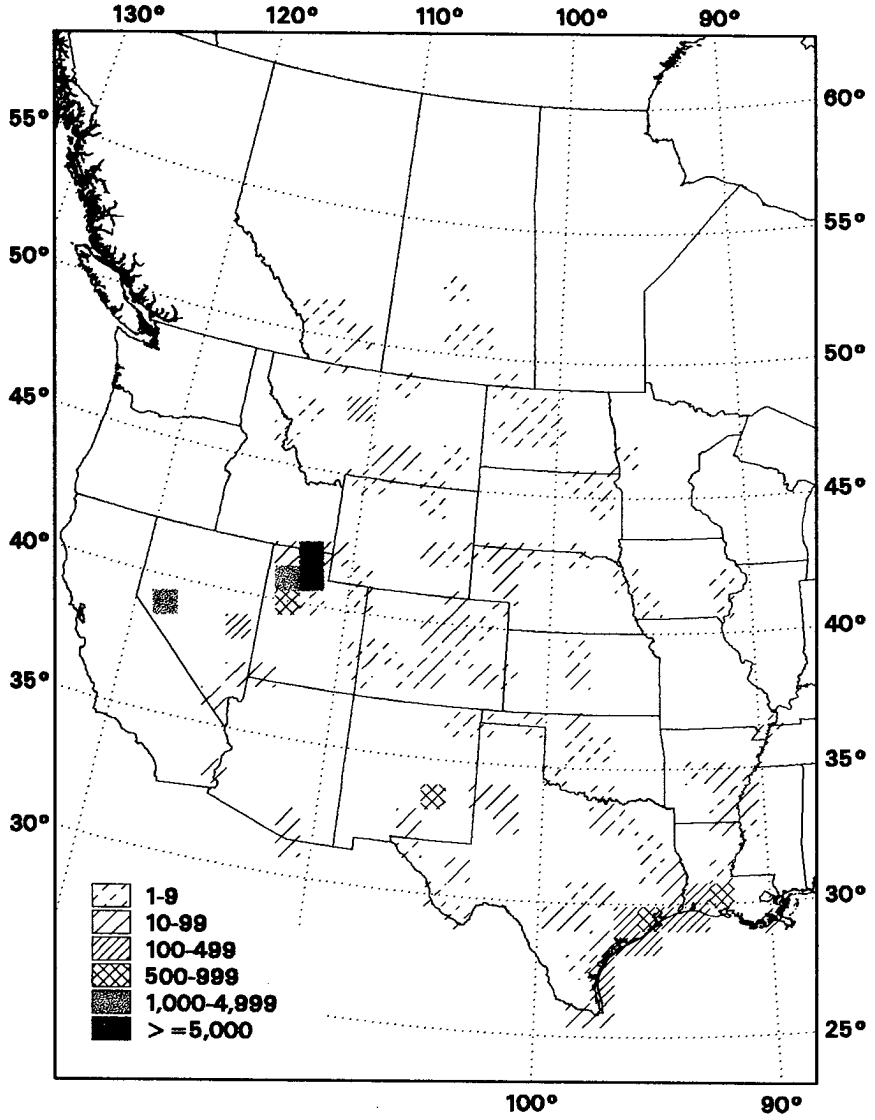
Mountain Plover *(Charadrius montanus)*

Body Size: Medium
Foraging Guild: Terrestrial/aquatic gleaner
Foraging Habitat: Water depth - dry to 2 cm; vegetative cover - bare to sparse
Migration Distance: Short
Migration Pattern: Not assigned
Dispersion: Moderately dispersed; 60% of total maximum sightings occur in 8 spring and 7 fall 0.1° lat-long blocks.
Six sites with highest counts: (see Appendix for more information)
Southeastern Colorado
Bolivar Flats, Galveston Island, Texas
West of Lakin, Kearny County, Kansas
Wetlands, Morton County, Kansas
Eden, Concho County, Texas
Jackson Reservoir, Morgan County, Colorado

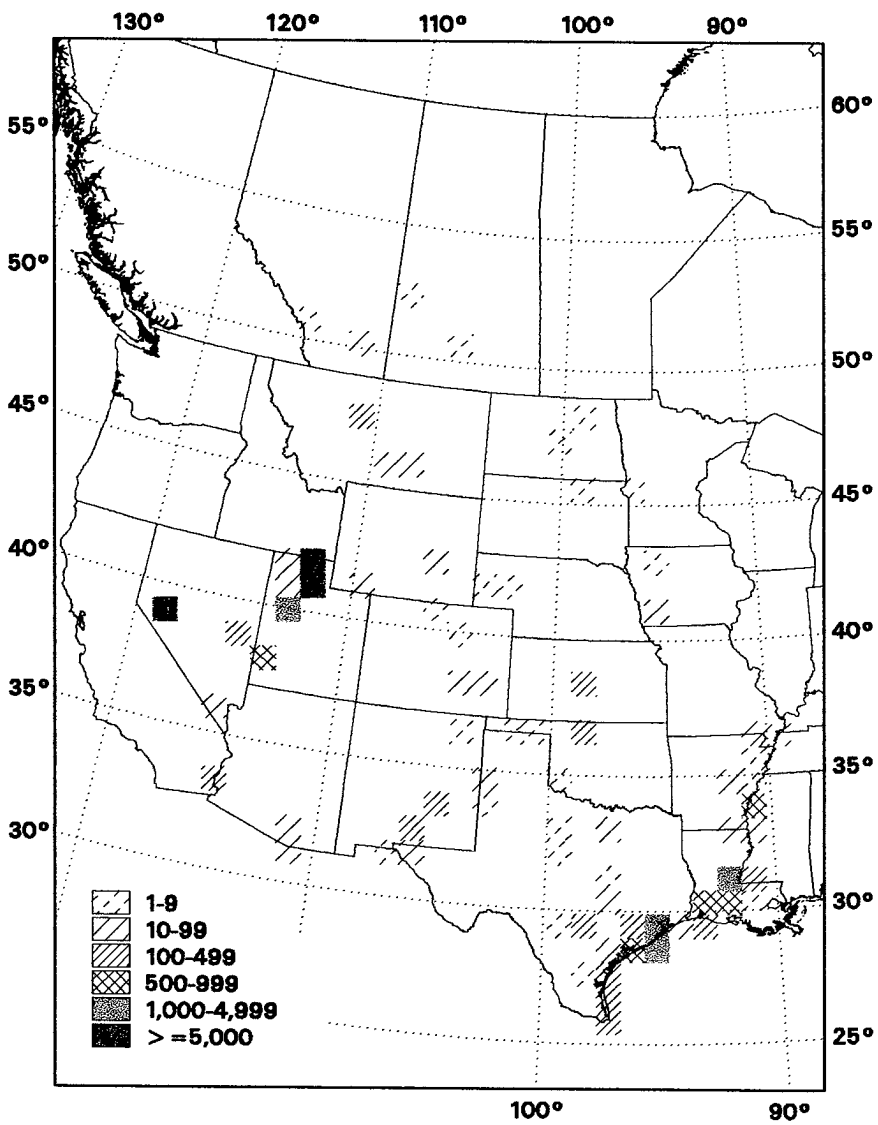


Black-necked Stilt

January-June

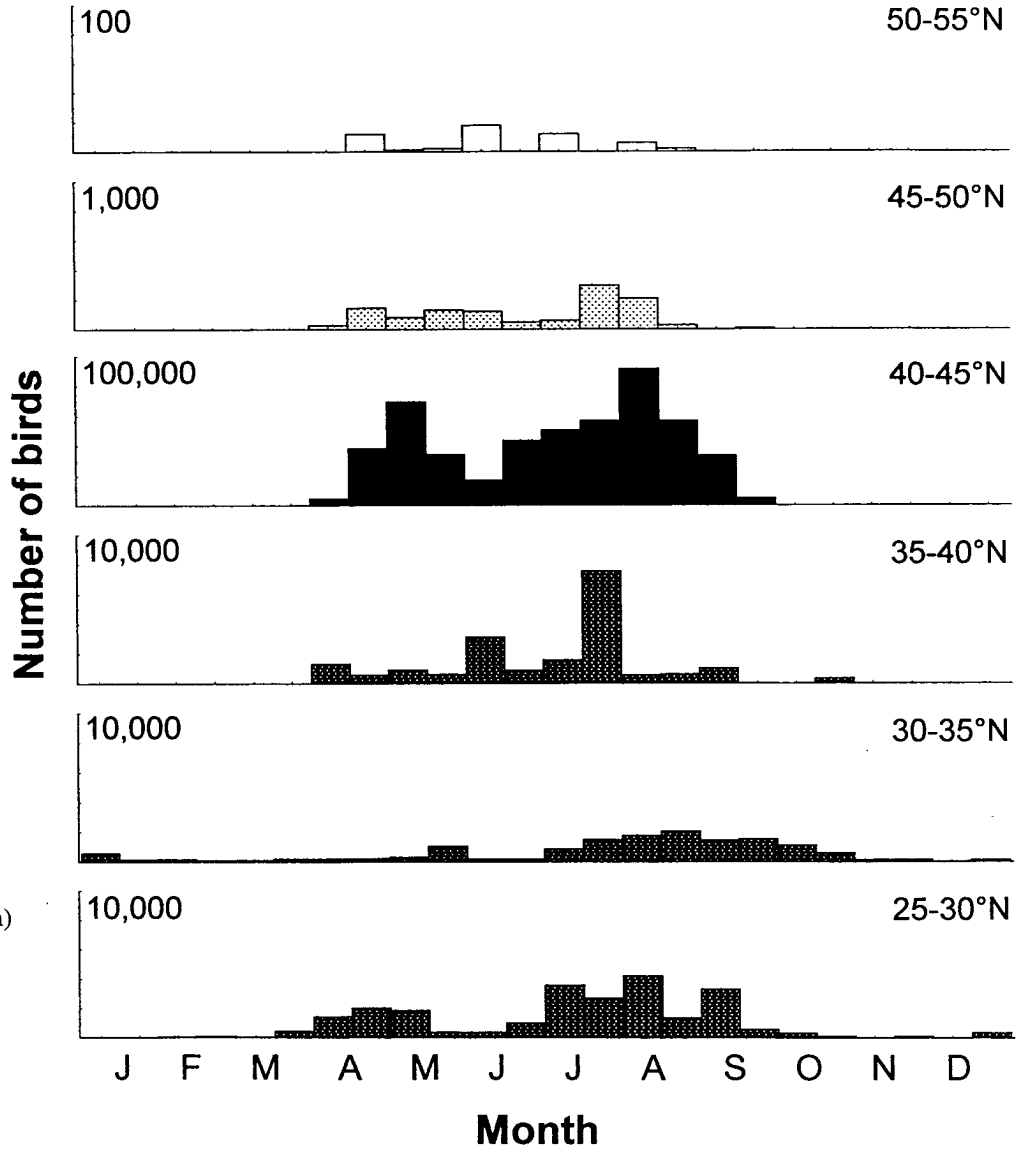


July-December

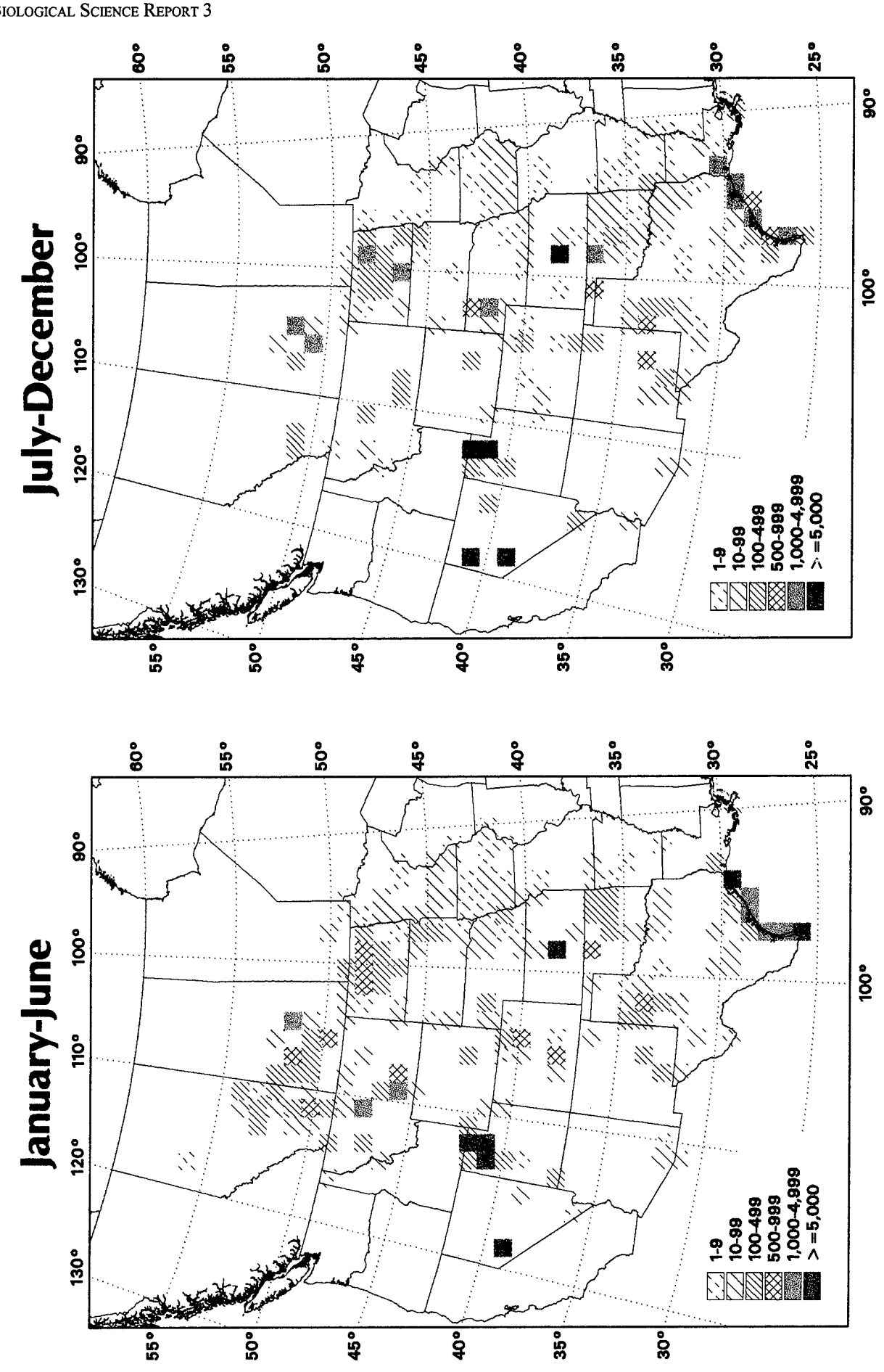


Black-necked Stilt *(Himantopus himantopus)*

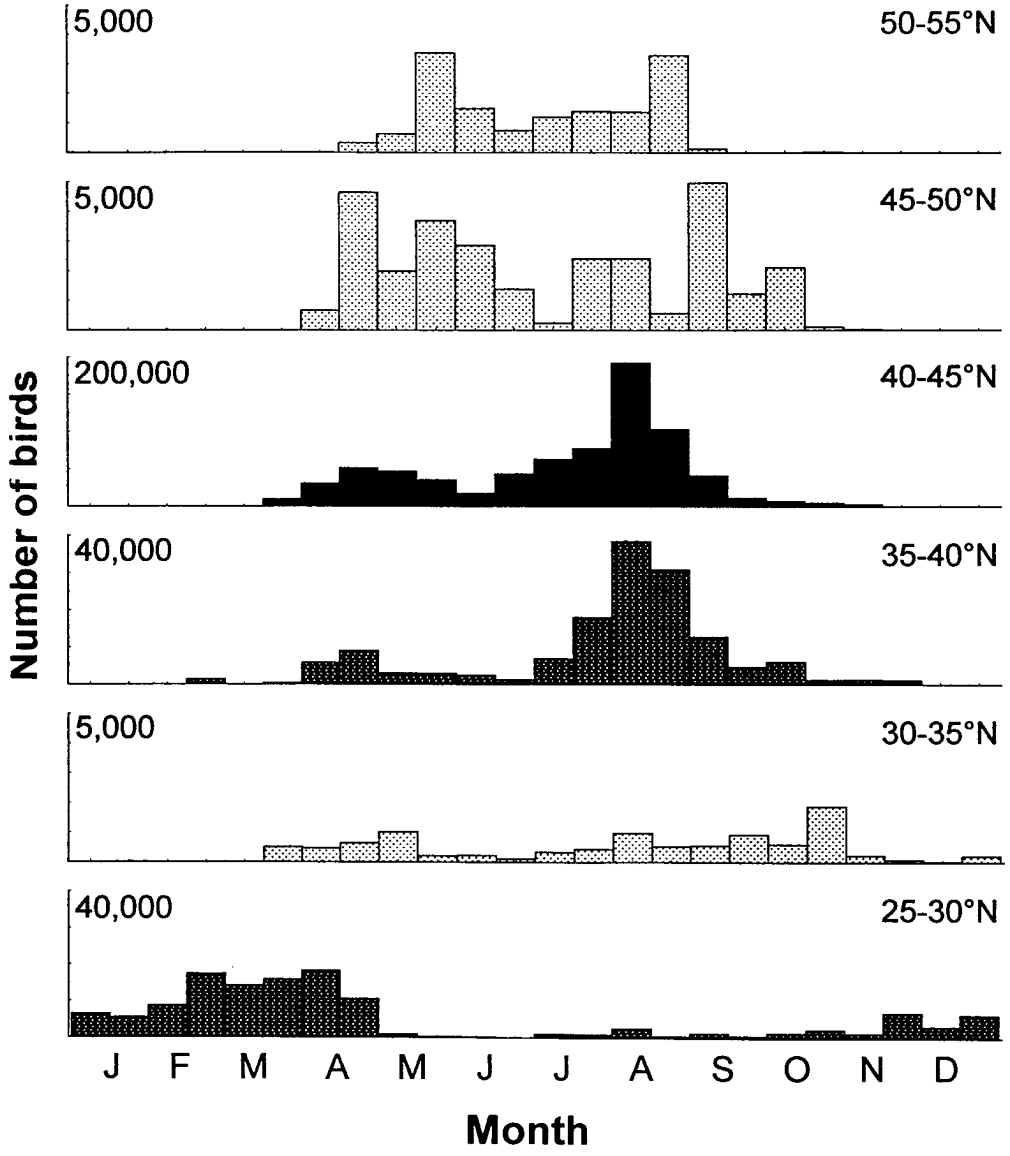
Body Size: Large
Foraging Guild: Aquatic gleaner/sweeper
Foraging Habitat: Water depth - 1 - 20 cm; vegetative cover - bare to sparse
Migration Distance: Short
Migration Pattern: Not assigned
Dispersion: .Concentrated; 60% of total maximum sightings occur in 2 spring and fall 0.1° lat-long blocks.
Six sites with highest counts: (see Appendix for more information)
Great Salt Lake area, Utah
Stillwater National Wildlife Refuge, Nevada
Brazoria National Wildlife Refuge, Texas
San Bernard National Wildlife Refuge, Texas
Catahoula Lake, Louisiana
Fish Springs National Wildlife Refuge, Utah



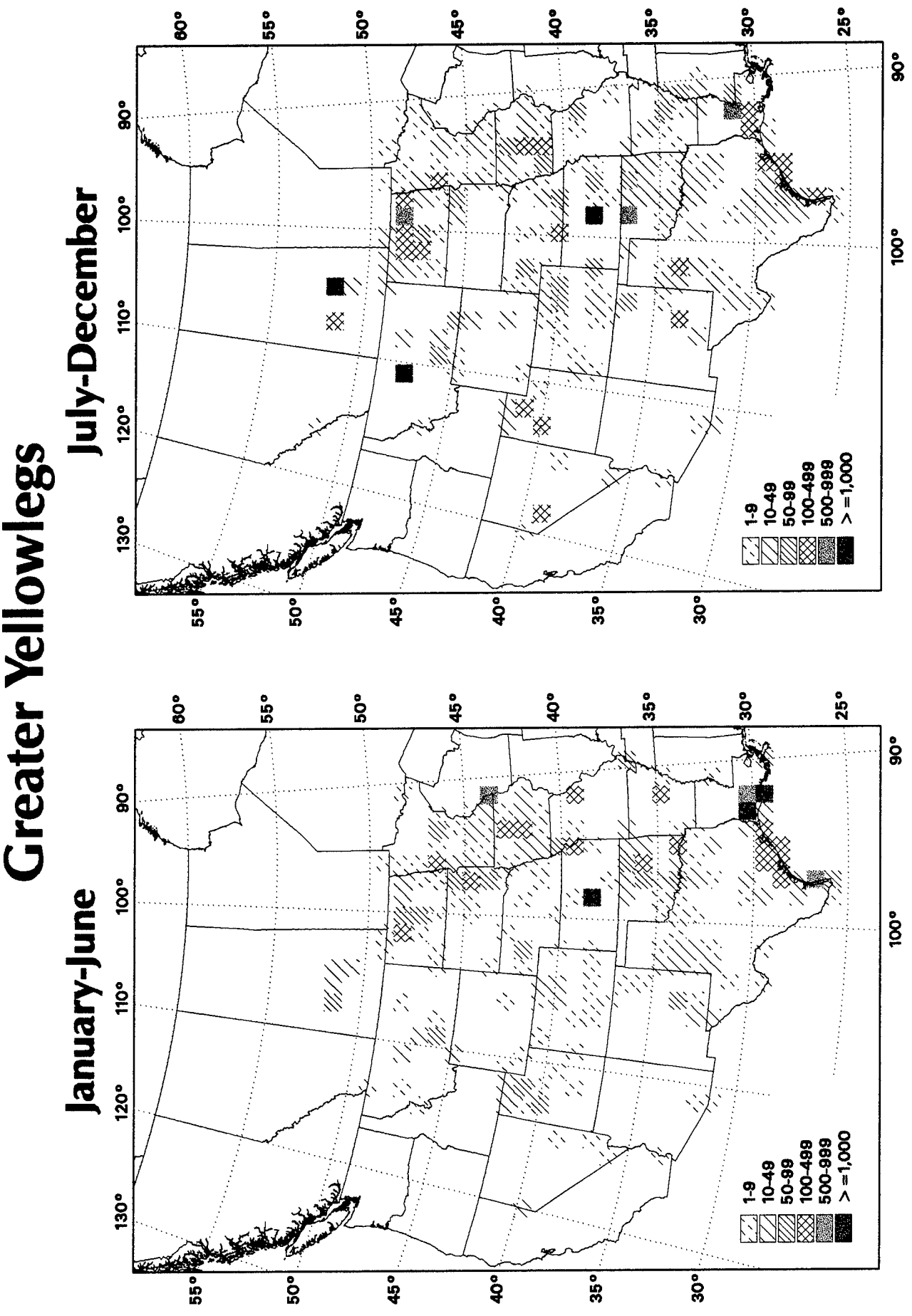
American Avocet



American Avocet *(Recurvirostra americana)*

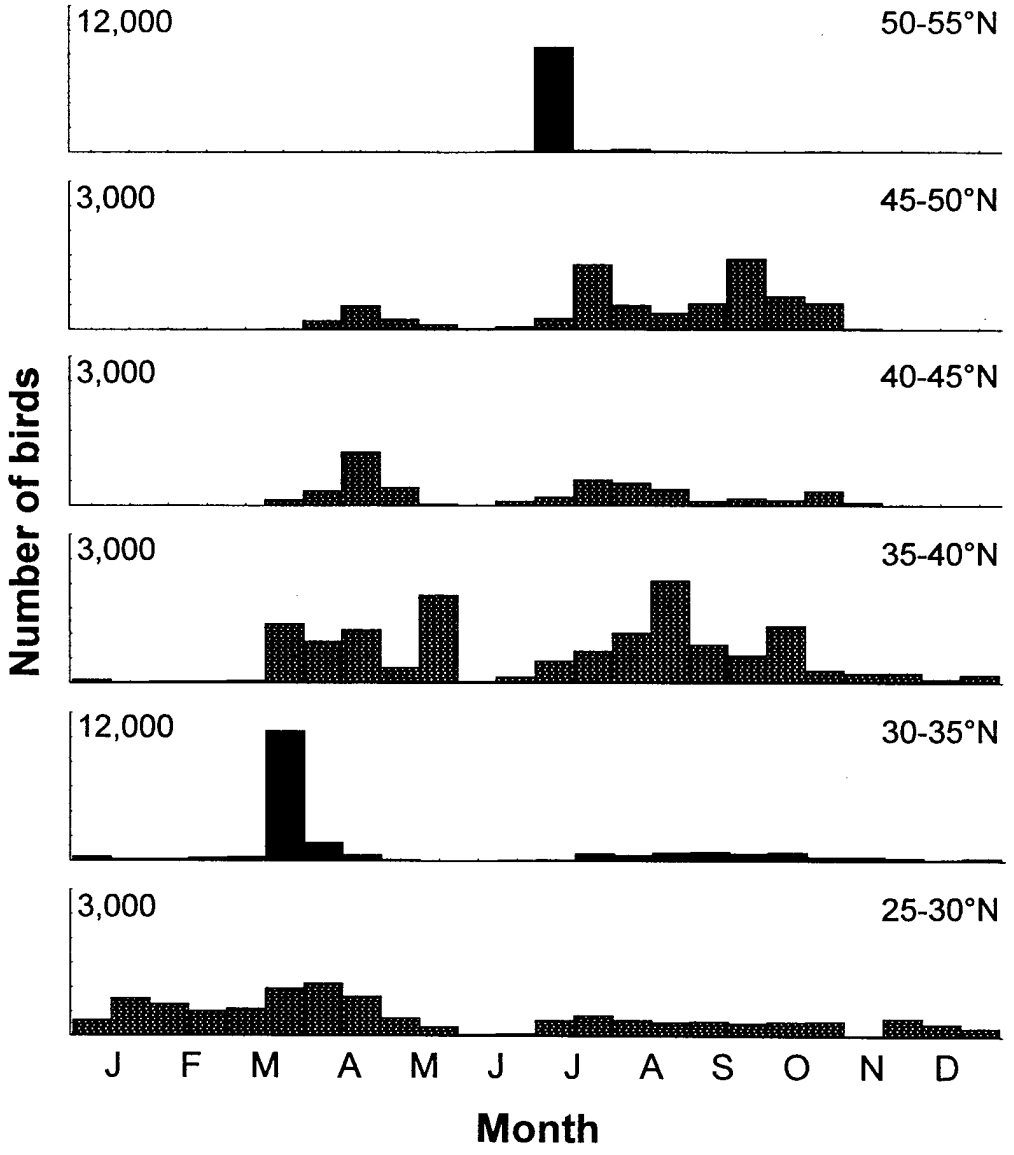


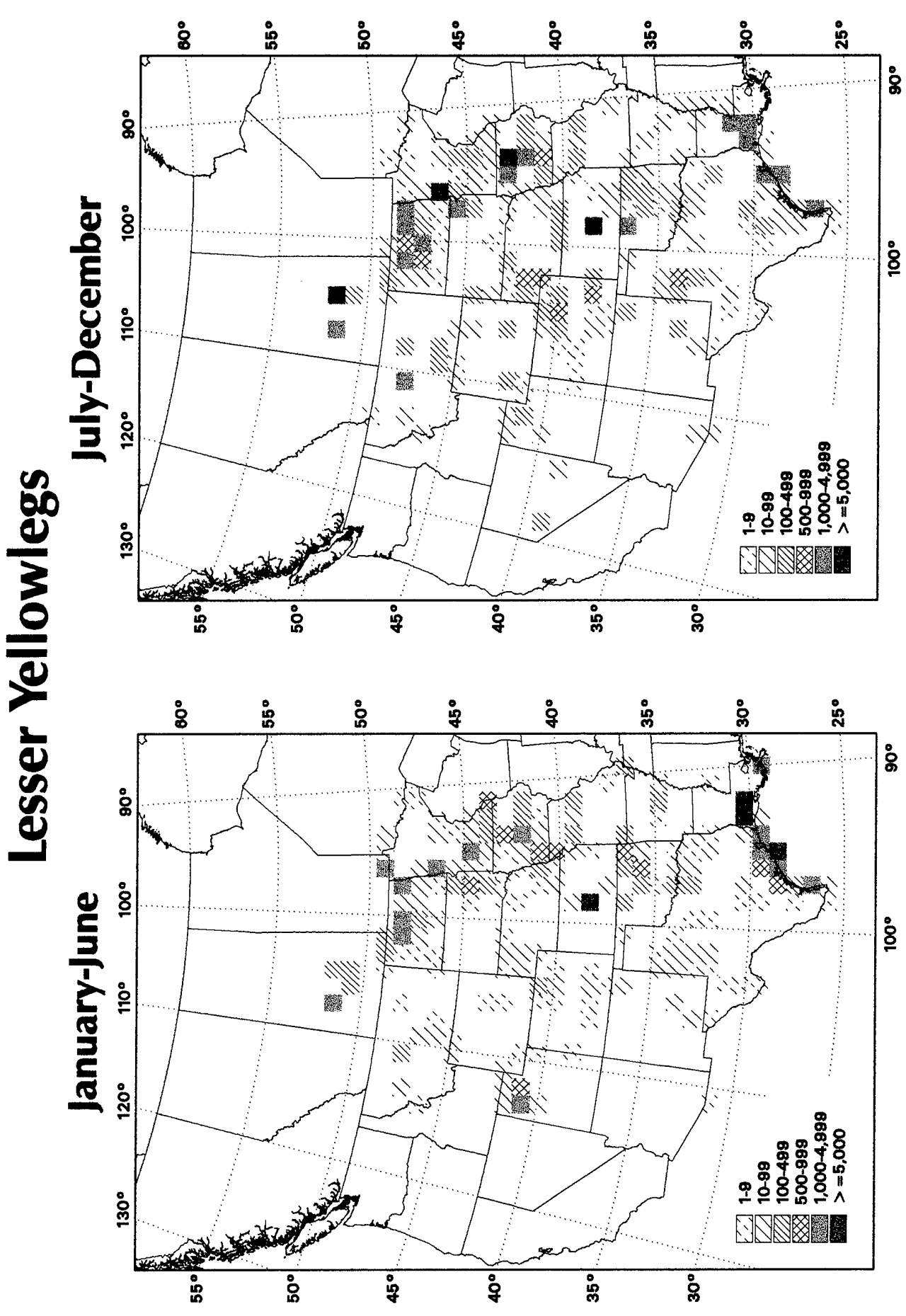
Body Size: Large
Foraging Guild: Aquatic gleaner/sweeper
Foraging Habitat: Water depth - dry to 12 cm; vegetative cover - bare to sparse
Migration Distance: Short
Migration Pattern: Not assigned
Dispersion: Moderately dispersed; 60% of total maximum sightings occur in 7 spring and 5 fall 0.1° lat-long blocks.
Six sites with highest counts: (see Appendix for more information)
Great Salt Lake area, Utah
Lahontan Valley, Nevada, including Carson Lake and Stillwater National Wildlife Refuge
Bolivar Flats, Galveston Island, Texas
Cheyenne Bottoms Wildlife Management Area, Kansas
Humboldt Wildlife Management Area, Nevada
Boca Chica Beach, Cameron County, Texas


Greater Yellowlegs
January-June
July-December
1-9
10-49
50-99
100-499
500-999
> =1,000
60°
55°
50°
45°
40°
35°
30°
25°
130°
120°
110°
100°
90°

Greater Yellowlegs *(Tringa melanoleuca)*

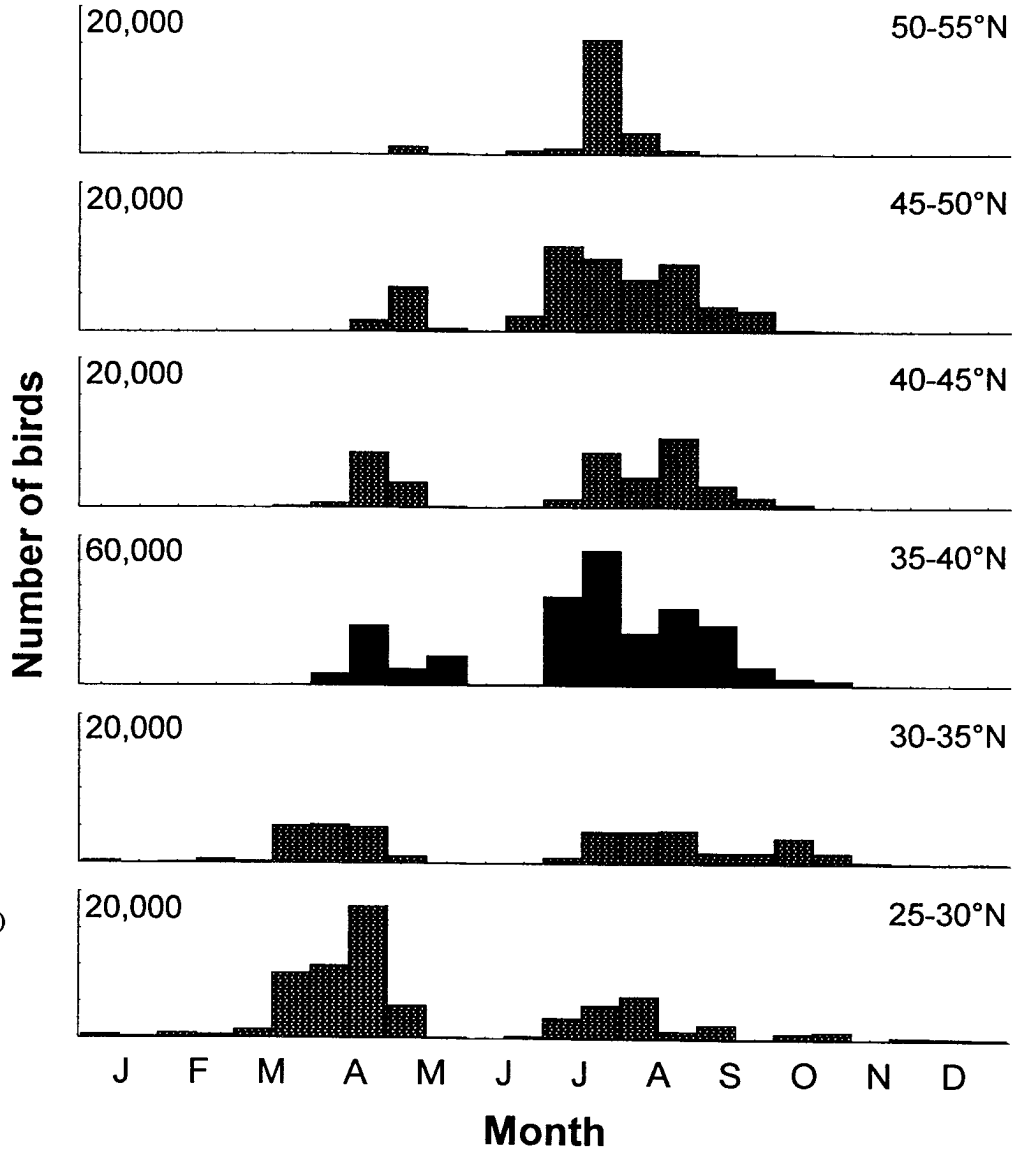
Body Size: Medium
Foraging Guild: Aquatic gleaner
Foraging Habitat: Water depth - dry to 12 cm; vegetative cover - bare to dense
Migration Distance: Intermediate
Migration Pattern: Narrow Band
Dispersion: Moderately dispersed; 60% of total maximum sightings occur in 3 spring and 5 fall 0.1° lat-long blocks.
Six sites with highest counts: (see Appendix for more information)
Cameron Parish, Louisiana
Quill Lakes, Saskatchewan
Cheyenne Bottoms Wildlife Management Area, Kansas
Vermilion Parish, Louisiana
Benton Lake National Wildlife Refuge, Montana
Salt Plains National Wildlife Refuge, Oklahoma

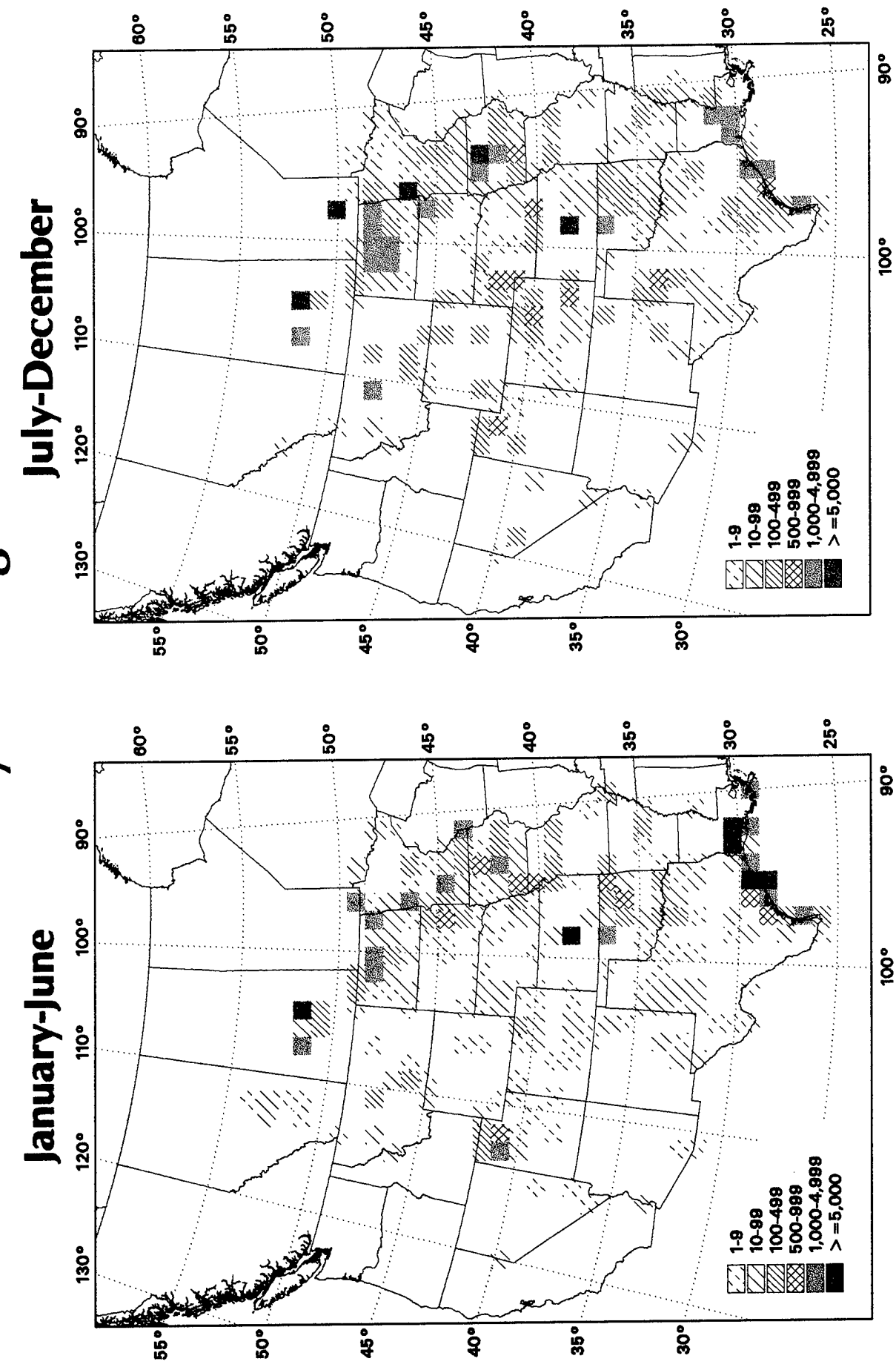


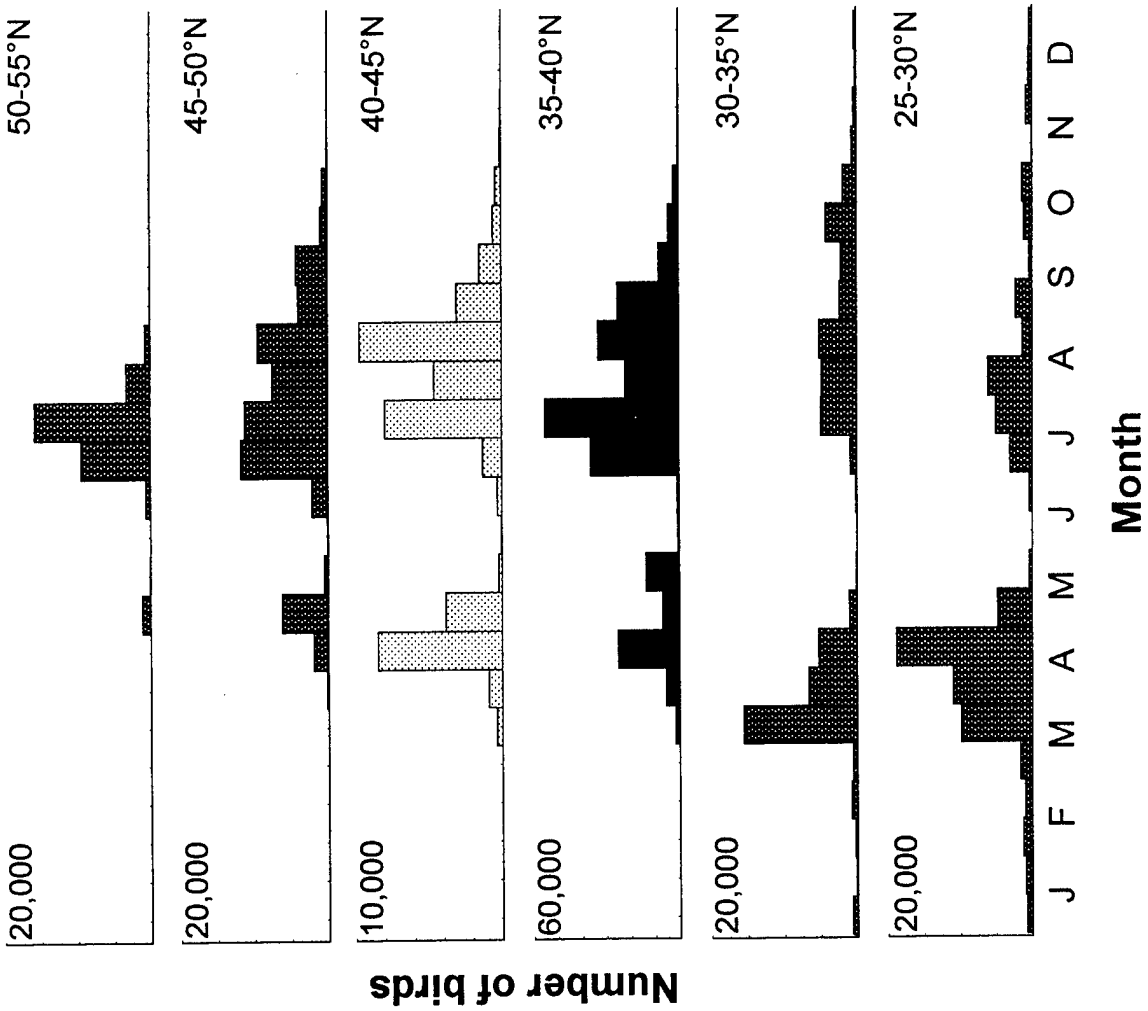

Lesser Yellowlegs
January-June
July-December
1-9
10-99
100-499
500-999
1,000-4,999
> =5,000
130°
120°
110°
100°
90°
60°
55°
50°
45°
40°
35°
30°
25°

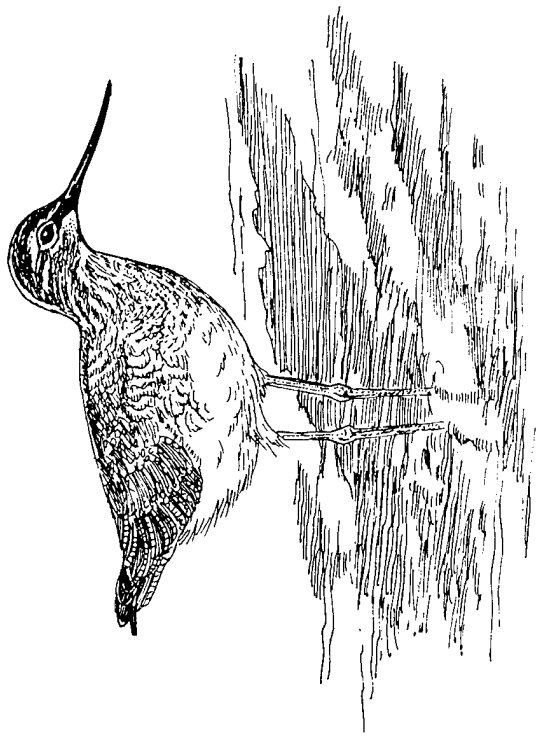
Lesser Yellowlegs *(Tringa flavipes)*

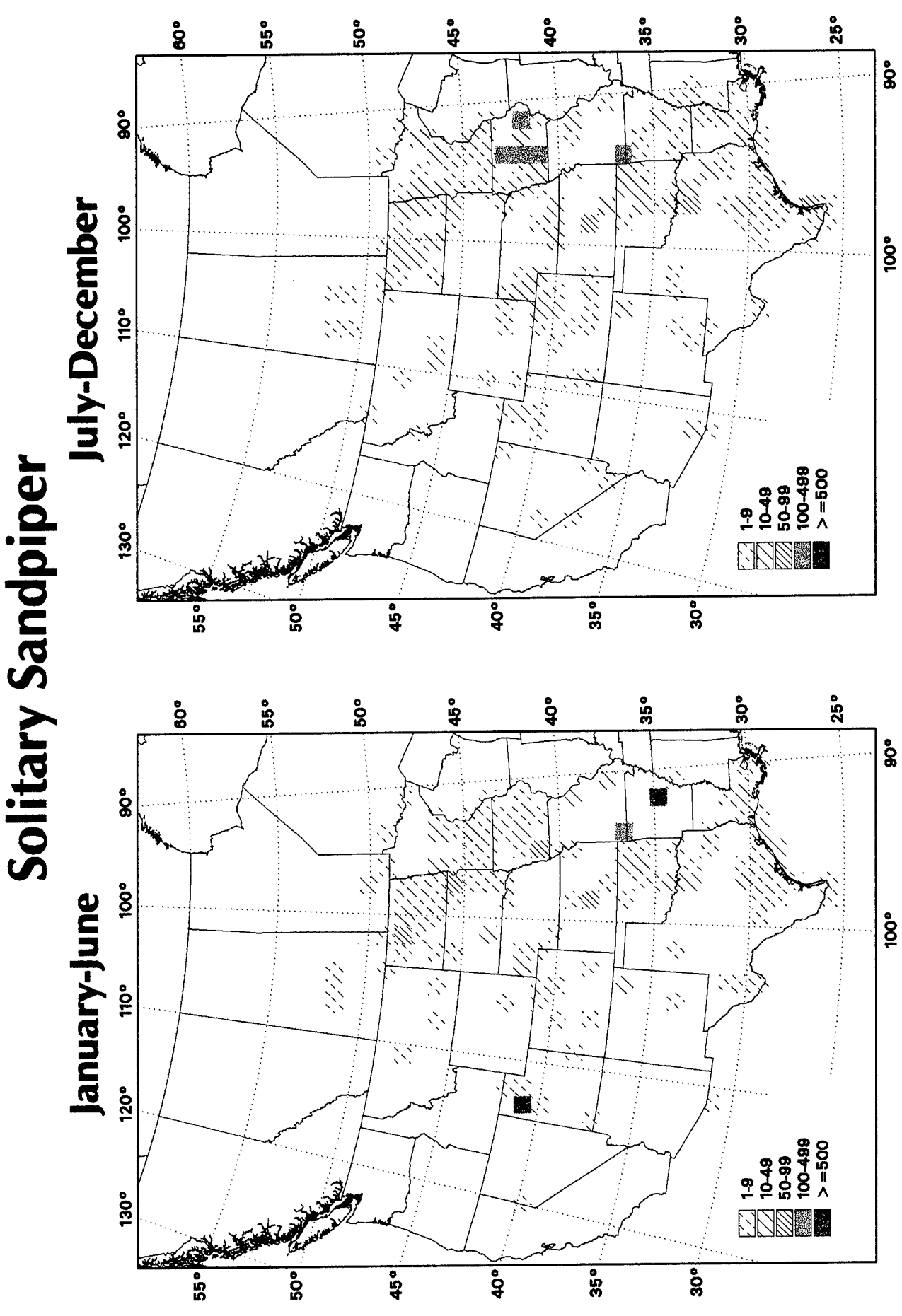
Body Size: Medium
Foraging Guild: Aquatic gleaner
Foraging Habitat: Water depth - dry to 10 cm; vegetative cover - bare to dense
Migration Distance: Intermediate
Migration Pattern: Narrow Band
Dispersion: Moderately dispersed; 60% of total maximum sightings occur in 9 spring and 5 fall 0.1° lat-long blocks.
Six sites with highest counts: (see Appendix for more information)
Cheyenne Bottoms Wildlife Management Area, Kansas
Quill Lakes, Saskatchewan
North Dakota State University, Fargo, North Dakota
San Bernard National Wildlife Refuge, Texas
Union Slough National Wildlife Refuge, Iowa
Brazoria National Wildlife Refuge, Texas




All yellowlegs
January-June
July-December
1-9
10-99
100-499
500-999
1,000-4,999
> =5,000
60°
55°
50°
45°
40°
35°
30°
25°
130°
120°
110°
100°
90°

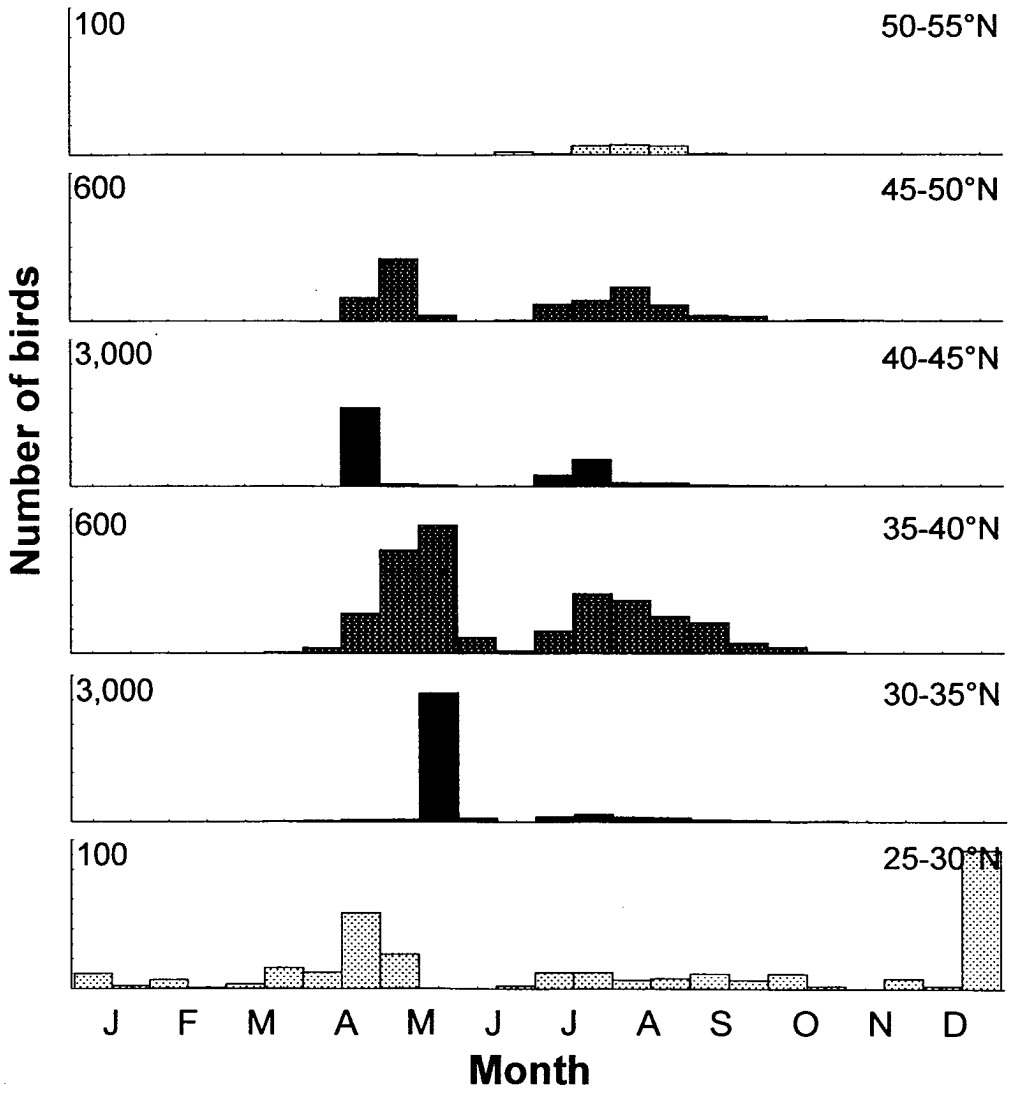

50-55°N
45-50°N
40-45°N
35-40°N
30-35°N
25-30°N
20,000
20,000
10,000
60,000
20,000
20,000
J F M A M J J A S O N D
Month
Number of birds

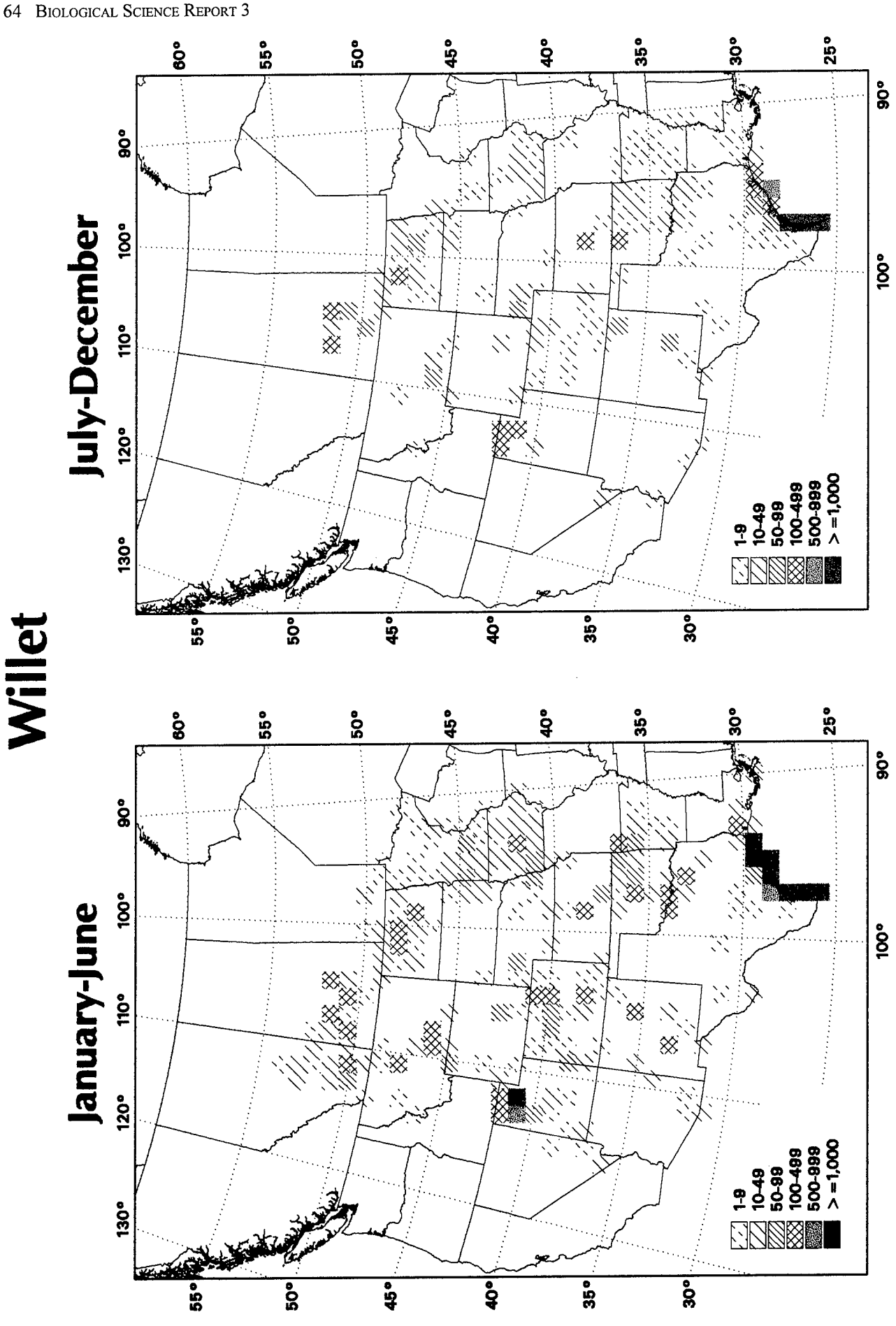



Solitary Sandpiper
January-June
July-December
1-9
10-49
50-99
100-499
> =500
60°
55°
50°
45°
40°
35°
30°
25°
130°
120°
110°
100°
90°

Solitary Sandpiper ***(Tringa solitaria)***

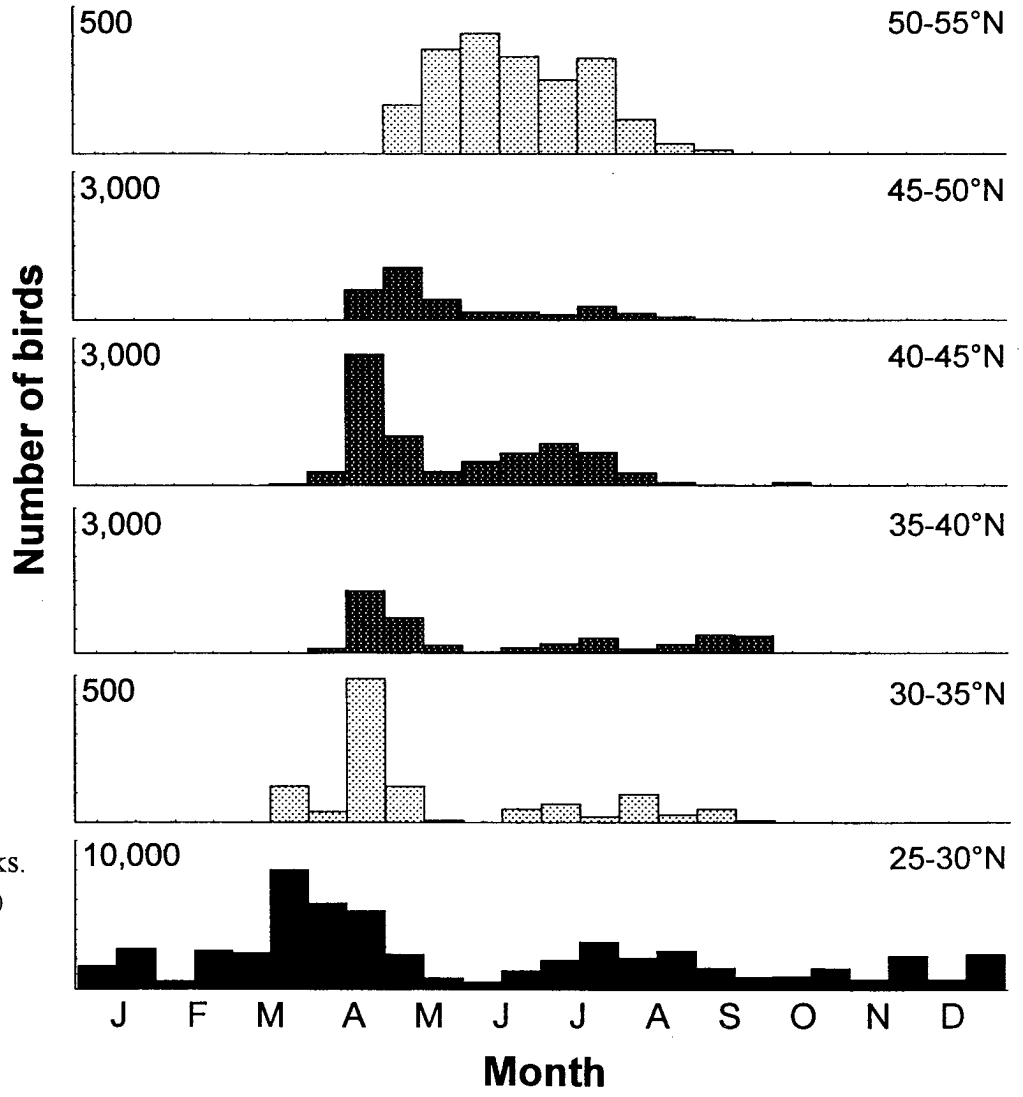
Body Size: Medium
Foraging Guild: Aquatic gleaner
Foraging Habitat: Water depth - wet to 5 cm; vegetative cover - bare to dense
Migration Distance: Intermediate
Migration Pattern: Widespread
Dispersion: Concentrated to broadly dispersed; 60% of total maximum sightings occur in 2 spring and 29 fall 0.1° lat-long blocks.
Six sites with highest counts: (see Appendix for more information)
Anderson's Fish Hatchery, Lonoke County, Arkansas
Riverdale, Great Salt Lake, Utah
State Fish Hatchery, Arkansas
Springdale, Benton County, Arkansas
Coralville Reservoir, Johnson County, Iowa
Union Slough National Wildlife Refuge, Iowa

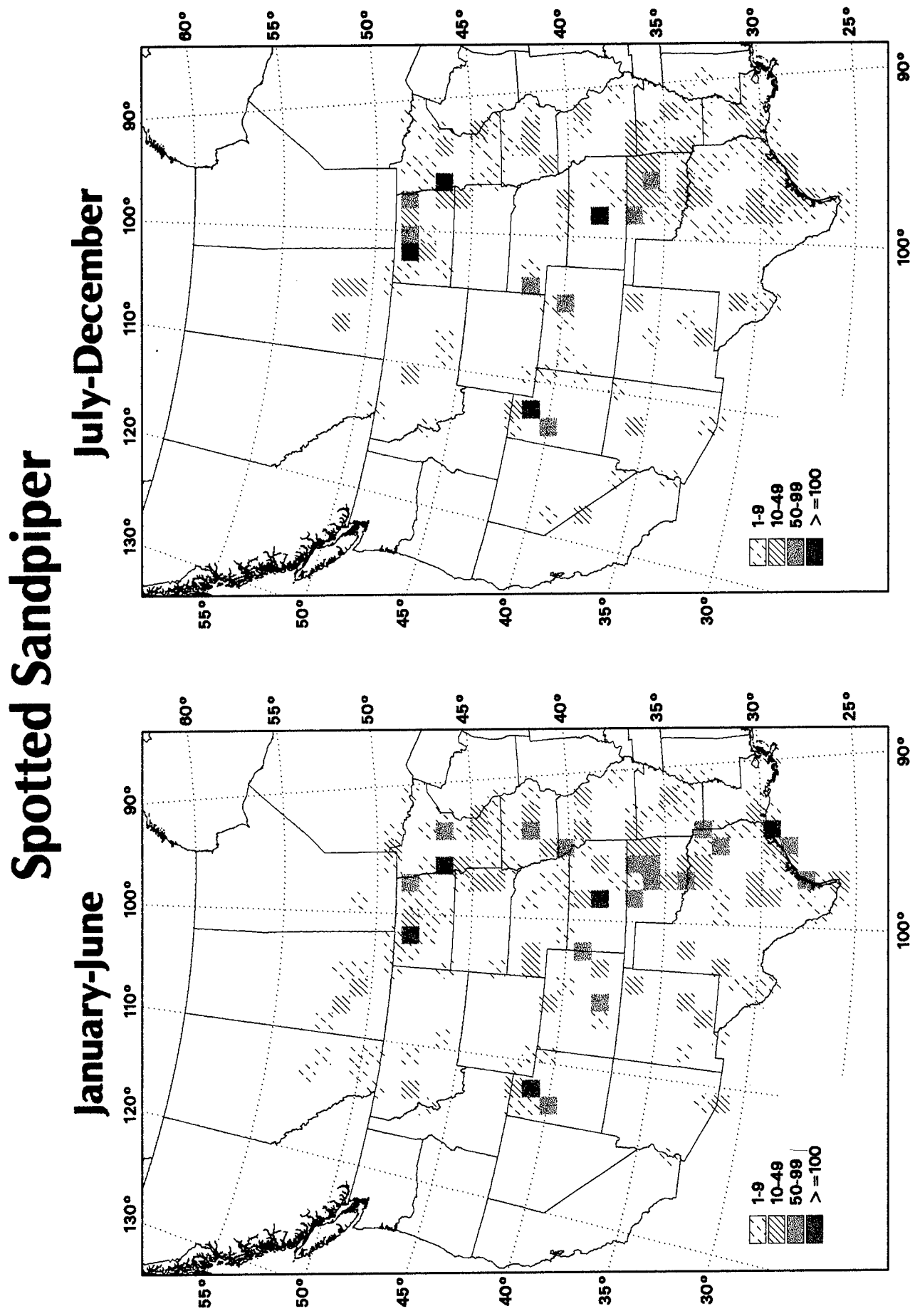



Willet
January-June
July-December
1-9
10-49
50-99
100-499
500-999
> =1,000
60°
55°
50°
45°
40°
35°
30°
25°
90°
100°
110°
120°
130°

Willet *(Catoptrophorus semipalmatus)*

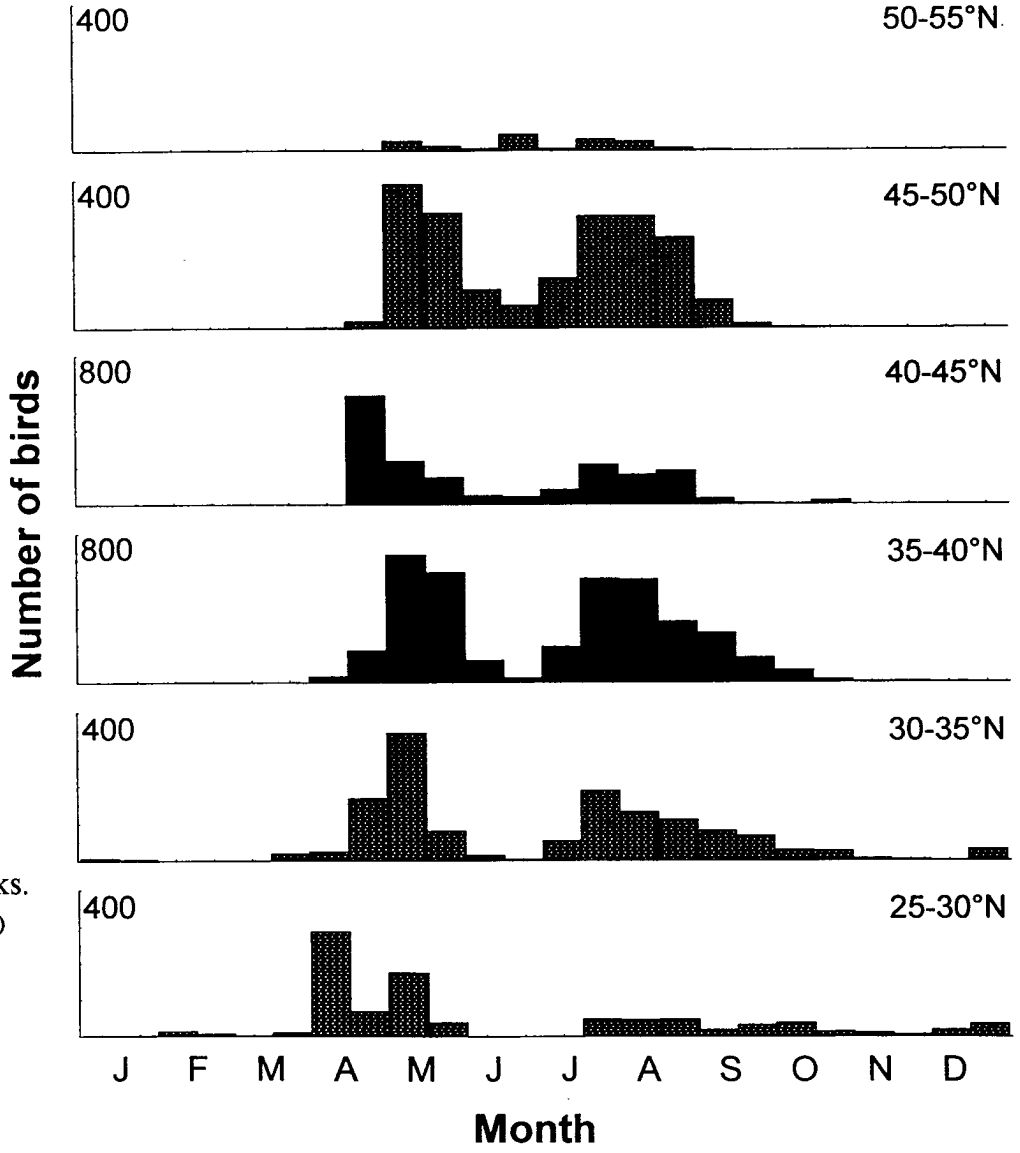
Body Size: Large
Foraging Guild: Aquatic gleaner
Foraging Habitat: Water depth - dry to 10 cm; vegetative cover - bare to sparse
Migration Distance: Short
Migration Pattern: Widespread
Dispersion: Broadly dispersed; 60% of total maximum sightings occur in 19 spring and 10 fall 0.1° lat-long blocks.
Six sites with highest counts: (see Appendix for more information)
Laguna Atascosa National Wildlife Refuge, Texas
Bolivar Flats, Galveston Island, Texas
Great Salt Lake area, Utah
Padre Island National Seashore, Texas
South Padre Island, Texas
Brazoria National Wildlife Refuge, Texas



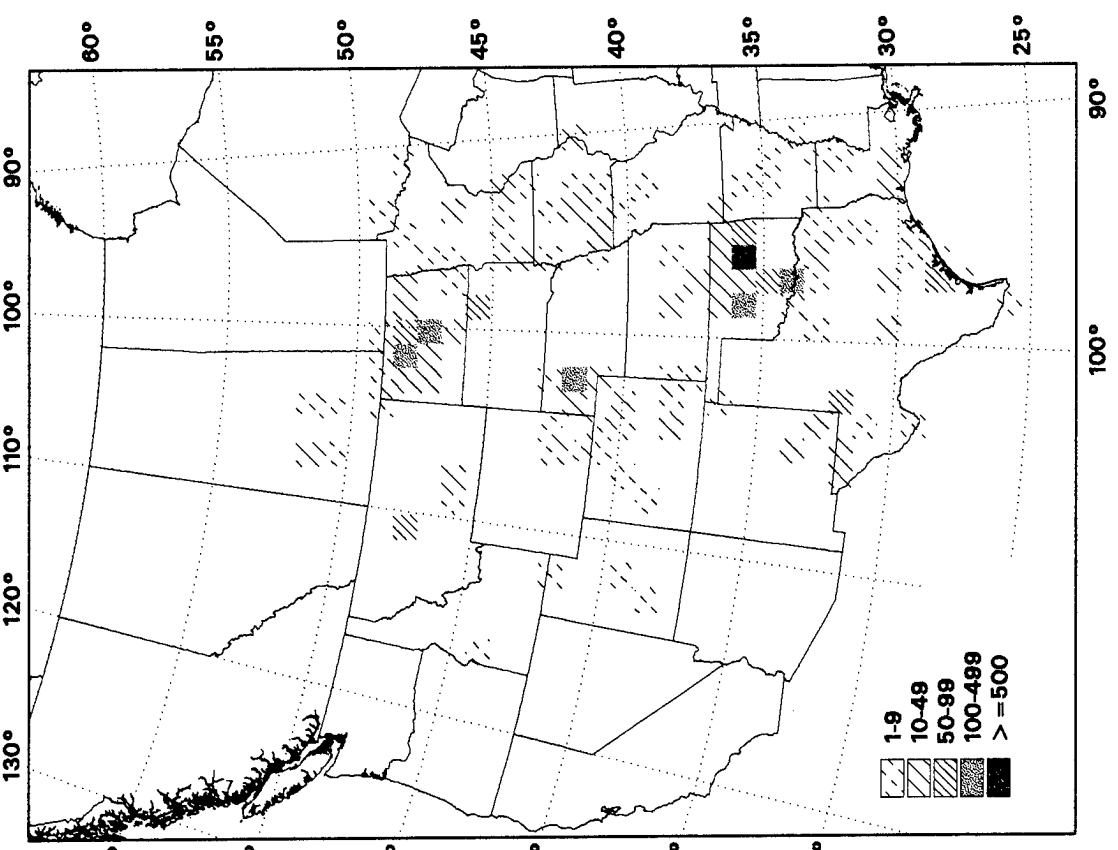

Spotted Sandpiper
January-June
July-December
1-9
10-49
50-99
> = 100
60°
55°
50°
45°
40°
35°
30°
25°
130°
120°
110°
100°
90°

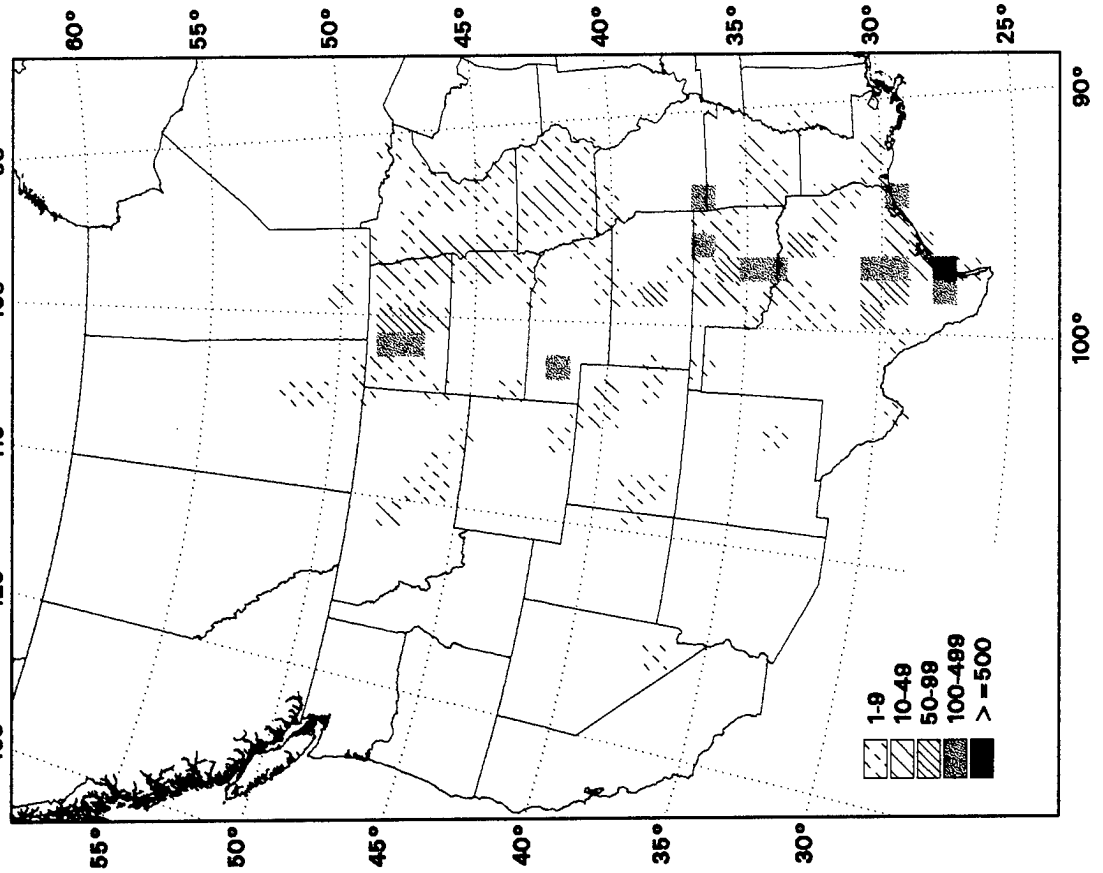
Spotted Sandpiper ***(Actitis macularia)***

Body Size: Medium
Foraging Guild: Terrestrial/aquatic gleaner/prober
Foraging Habitat: Water depth - wet to 4 cm; vegetative cover - bare to sparse
Migration Distance: Intermediate
Migration Pattern: Widespread
Dispersion: Broadly dispersed; 60% of total maximum sightings occur in 25 spring and 32 fall 0.1° lat-long blocks.
Six sites with highest counts: (see Appendix for more information)
Layton Marsh, Great Salt Lake, Utah
Cheyenne Bottoms Wildlife Management Area, Kansas
Bolivar Flats, Galveston Island, Texas
Sewage lagoons, Minot, North Dakota
Salt Plains National Wildlife Refuge, Oklahoma
Rice Lake National Wildlife Refuge, Minnesota

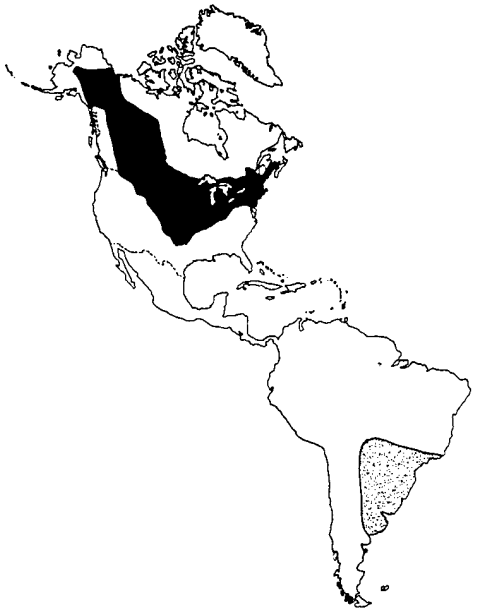


Upland Sandpiper

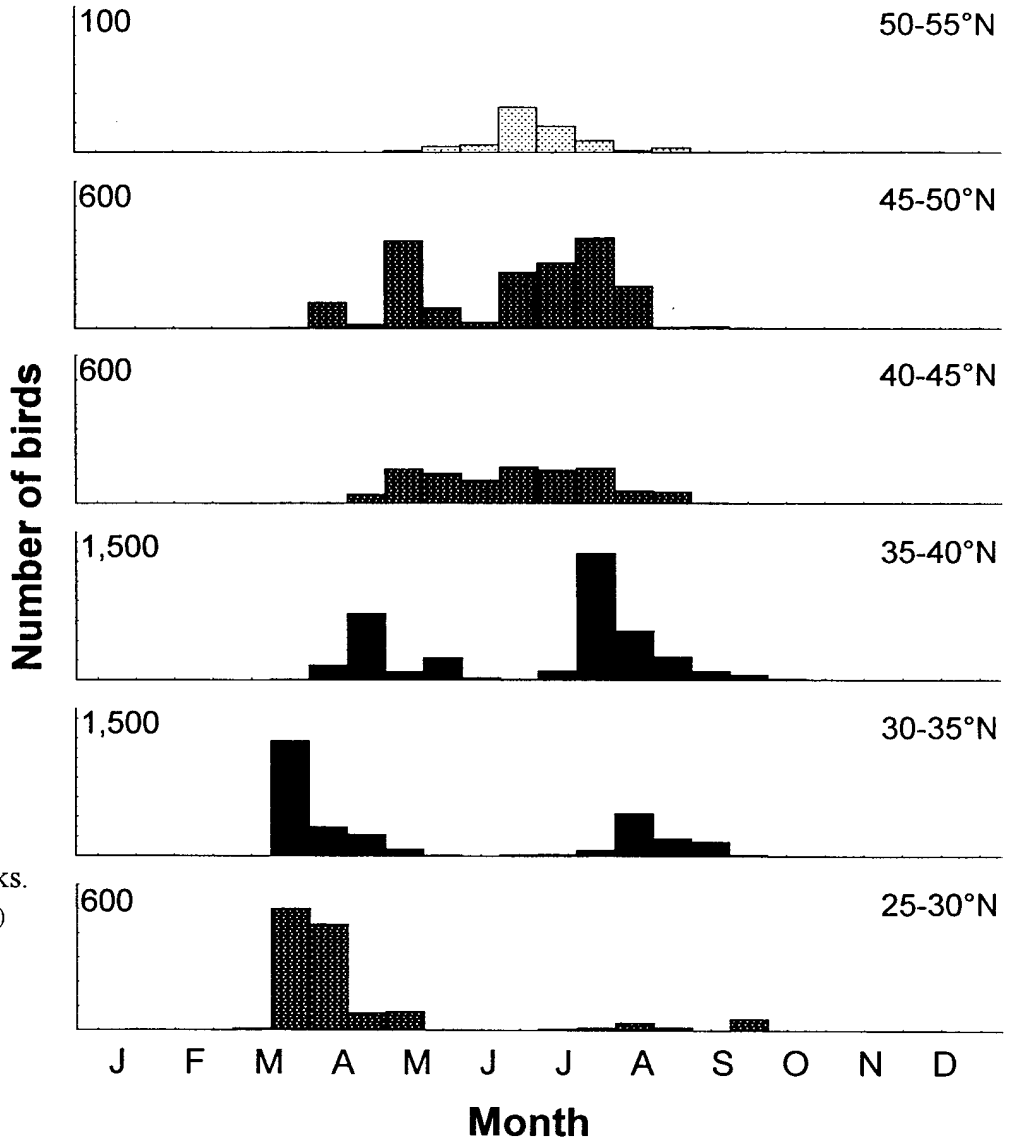


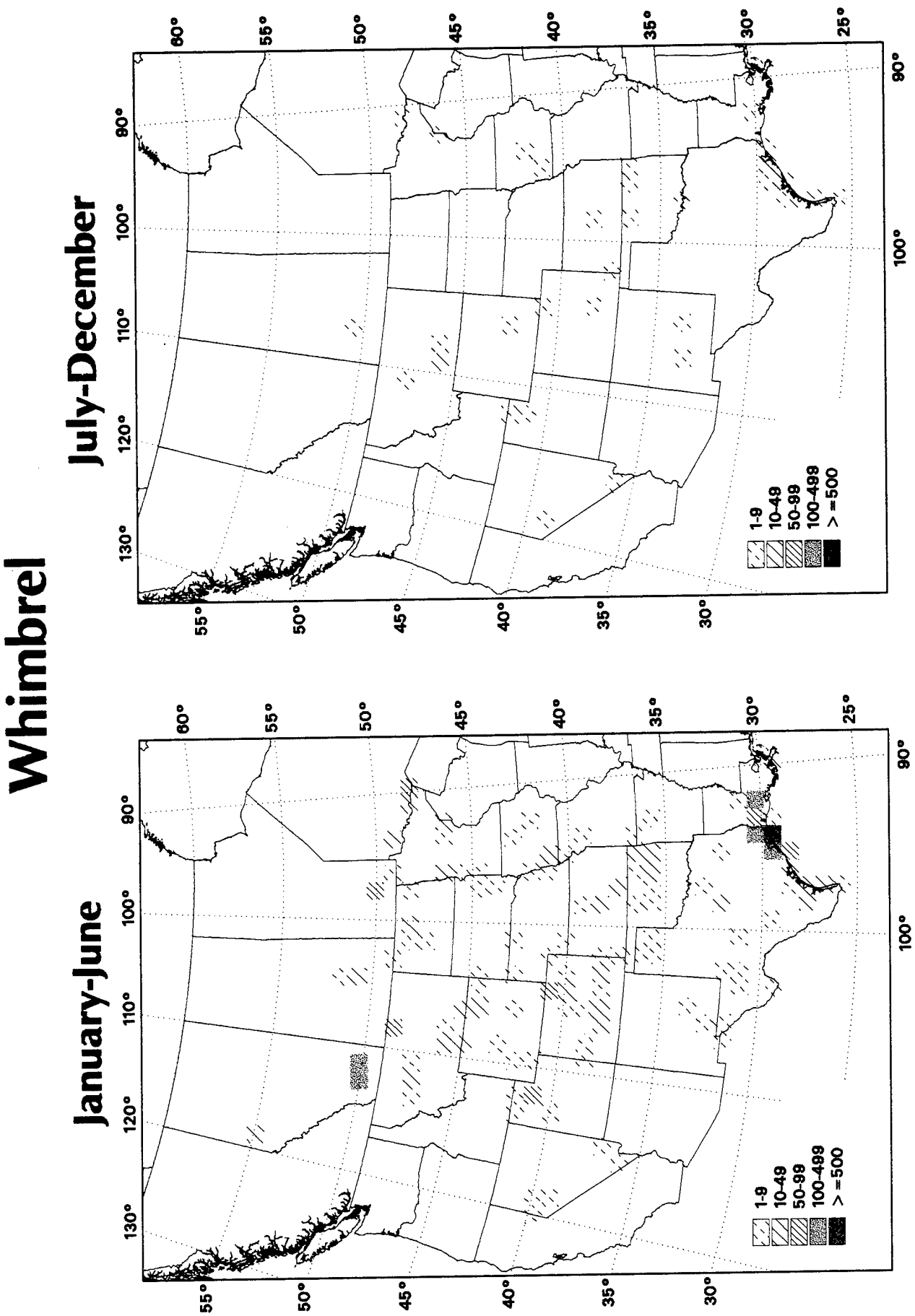


Upland Sandpiper *(Bartramia longicauda)*

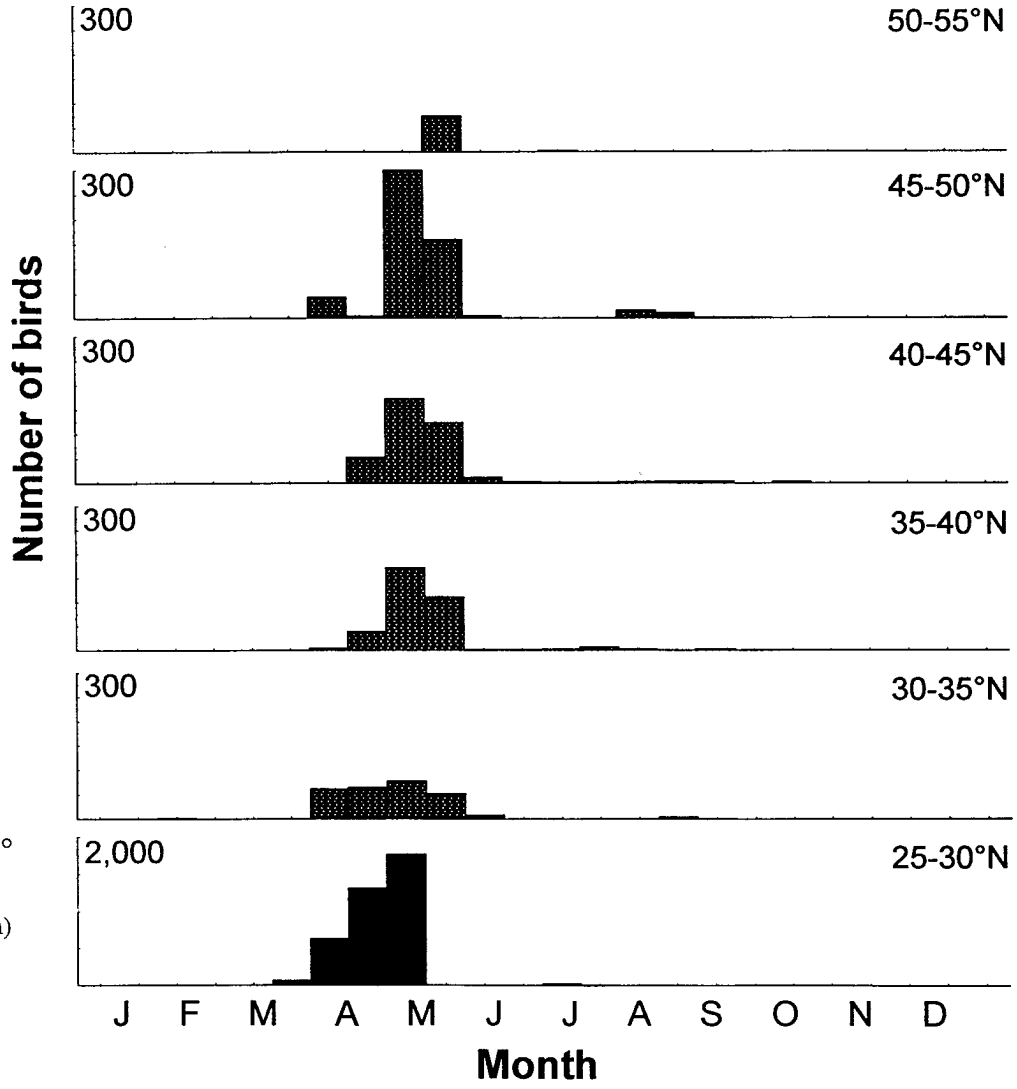


Body Size: Medium
Foraging Guild: Aquatic/terrestrial gleaner
Foraging Habitat: Water depth - dry to 4 cm; vegetative cover - bare to dense
Migration Distance: Intermediate
Migration Pattern: Narrow Band
Dispersion: Broadly dispersed; 60% of total maximum sightings occur in 10 spring and 12 fall 0.1° lat-long blocks.
Six sites with highest counts: (see Appendix for more information)
Corpus Christi, Texas
Coweta sod farms, Wagoner County, Oklahoma
Norman, Cleveland County, Oklahoma
Near Southard, Blaine County, Oklahoma
Chambers County, Texas
Hagerman National Wildlife Refuge, Texas

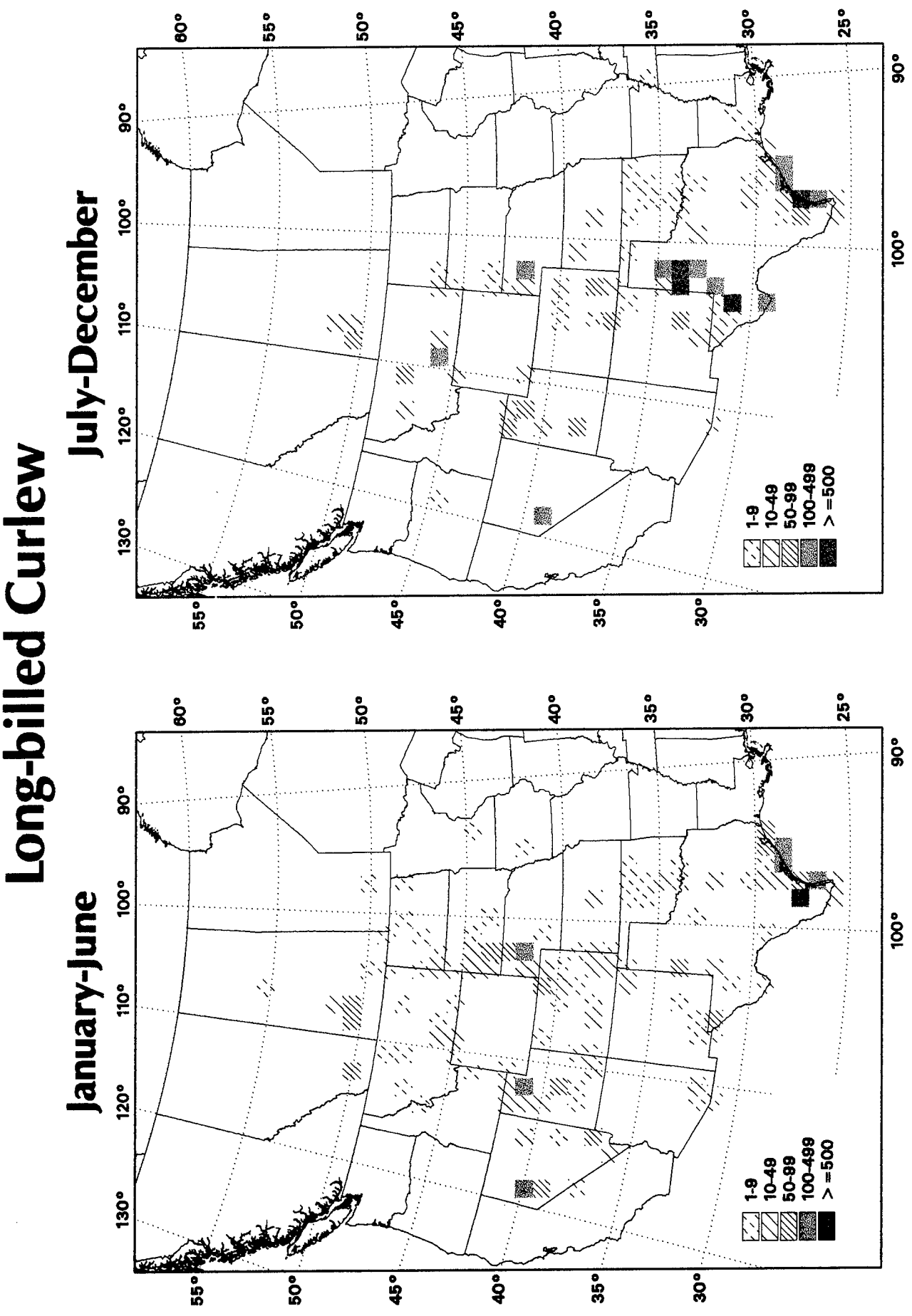



Whimbrel
January-June
July-December
1-9
10-49
50-99
100-499
> =500
60°
55°
50°
45°
40°
35°
30°
25°
130°
120°
110°
100°
90°
80°

Whimbrel *(Numenius phaeopus)*

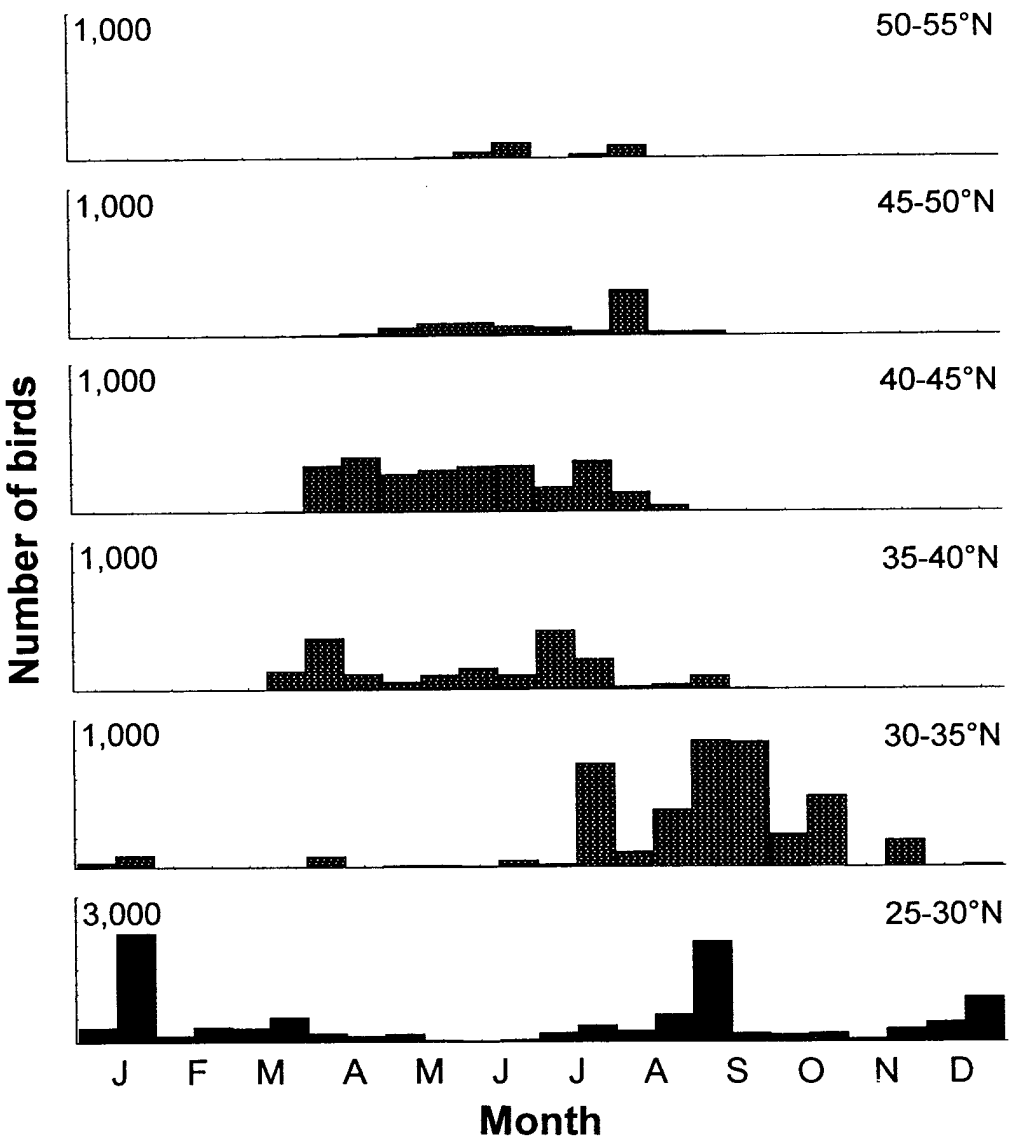


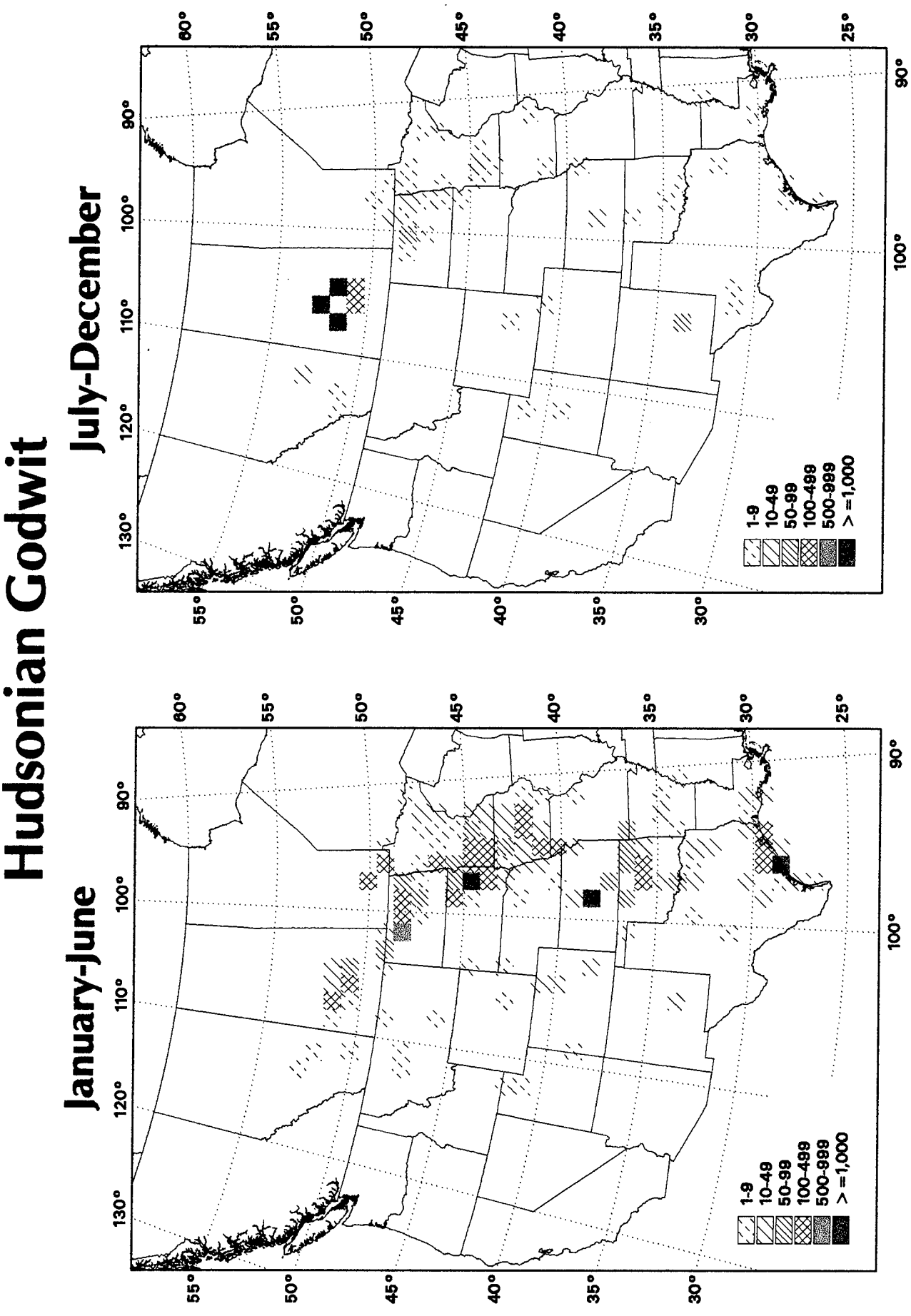
Body Size: Large
Foraging Guild: Terrestrial/aquatic gleaner/prober
Foraging Habitat: Water depth - dry to 12 cm; vegetative cover - bare to sparse
Migration Distance: Intermediate
Migration Pattern: Widespread
Dispersion: Moderately to broadly dispersed; 60% of total maximum sightings occur in 7 spring and 11 fall 0.1° lat-long blocks.
Six sites with highest counts: (see Appendix for more information)
Chambers County, Texas
Anahuac National Wildlife Refuge, Texas
North of Winnie, Texas
West Jefferson County, Texas
Brazoria National Wildlife Refuge, Texas
Taber area, Alberta


Long-billed Curlew
January-June
July-December
1-9
10-49
50-99
100-499
> =500
60°
55°
50°
45°
40°
35°
30°
25°
130°
120°
110°
100°
90°

Long-billed Curlew ***(Numenius americanus)***

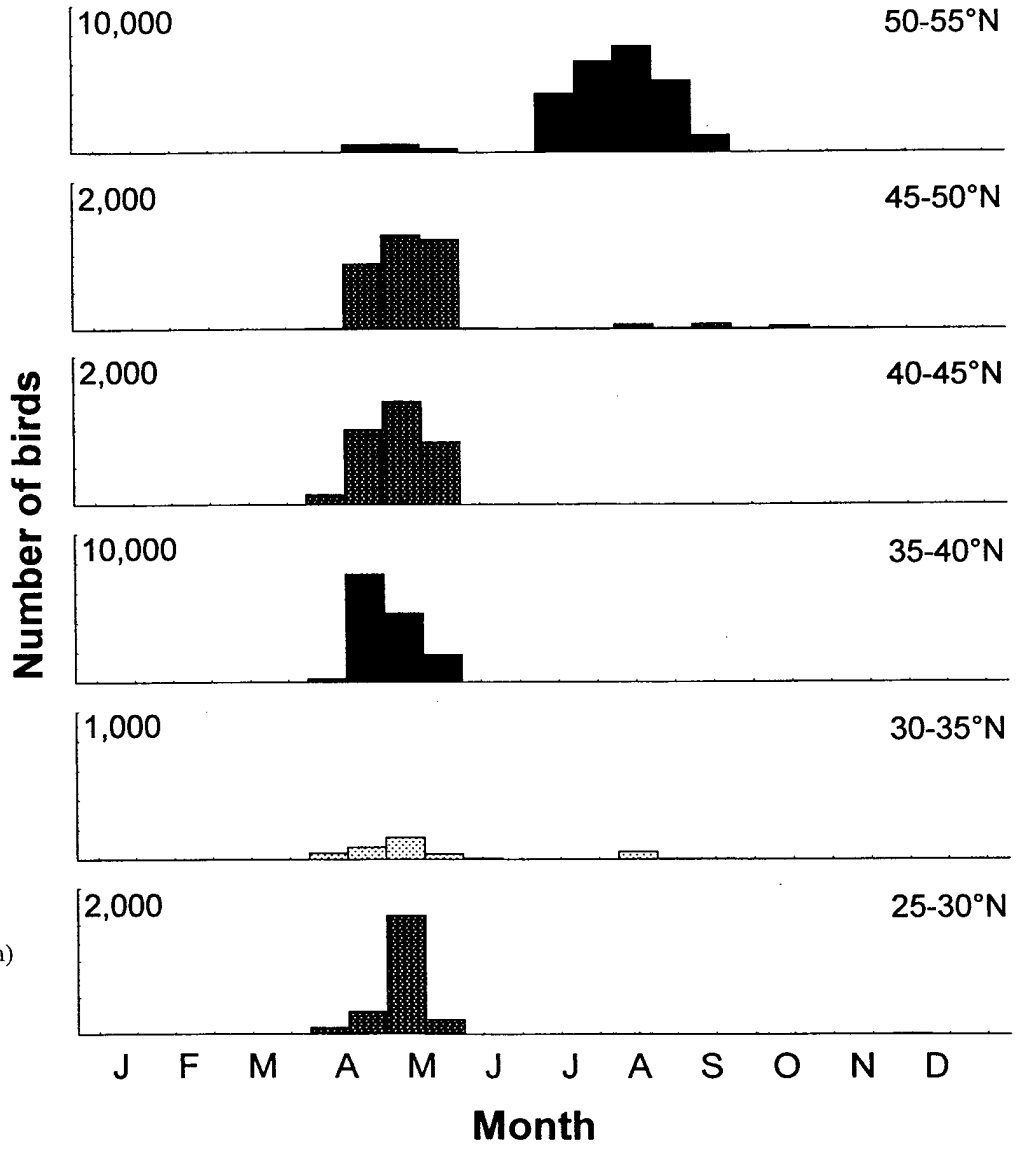
Body Size: Large
Foraging Guild: Terrestrial/aquatic gleaner/prober
Foraging Habitat: Water depth - dry to 9 cm; vegetative cover - bare to dense
Migration Distance: Short
Migration Pattern: Not assigned
Dispersion: Broadly to moderately dispersed; 60% of total maximum sightings occur in 10 spring and 9 fall 0.1° lat-long blocks.
Six sites with highest counts: (see Appendix for more information)
Western Nueces County, Texas
Playas, Lubbock County, Texas
Playas, Hale County, Texas
Playas, Hockley County, Texas
Sinton area, San Patricio County, Texas
Toyah Lake, Texas



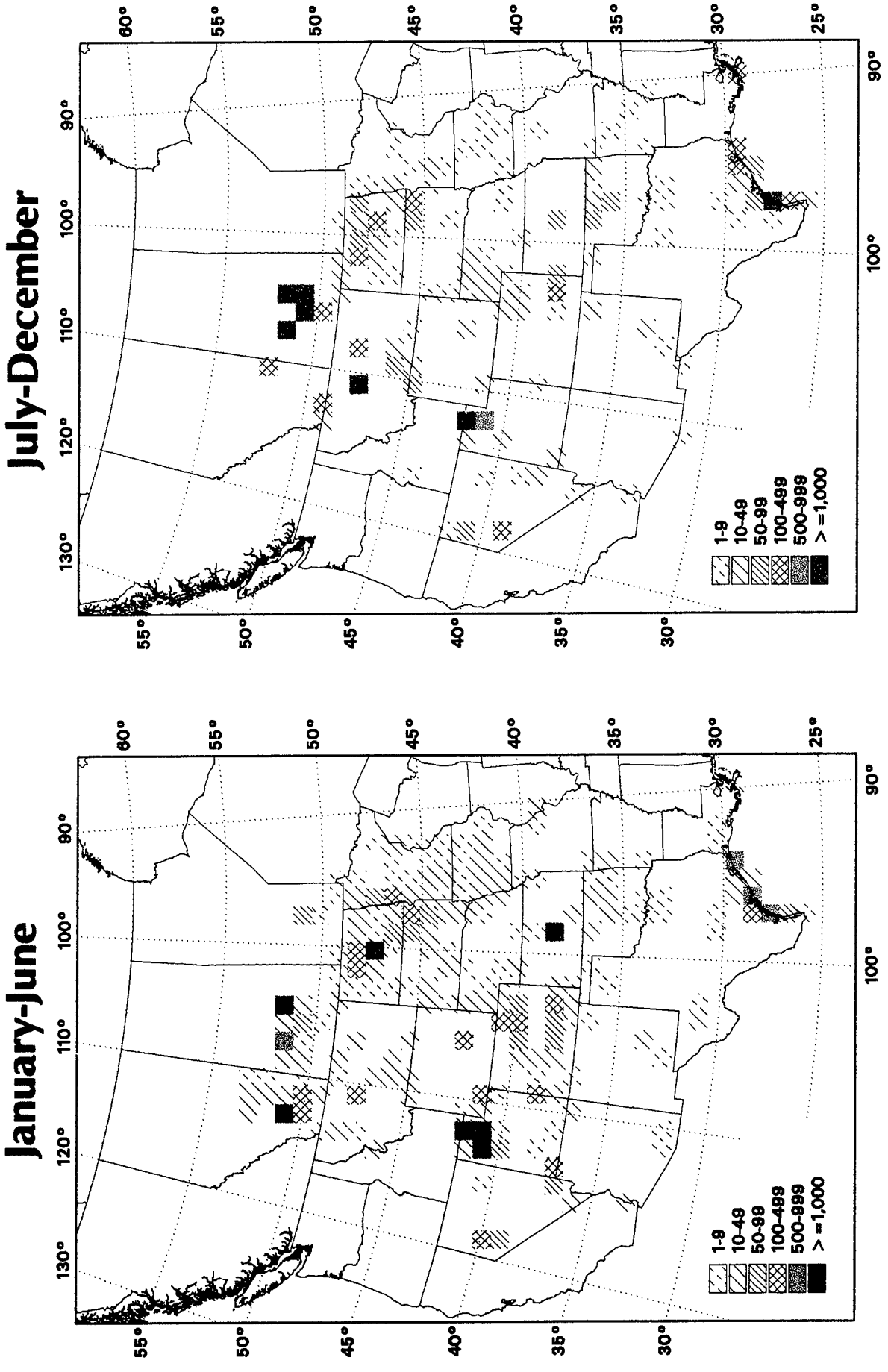

Hudsonian Godwit
January-June
July-December
1-9
10-49
50-99
100-499
500-999
> =1,000
60°
55°
50°
45°
40°
35°
30°
25°
90°
100°
110°
120°
130°

Hudsonian Godwit *(Limosa haemastica)*

Body Size: Large
Foraging Guild: Aquatic prober
Foraging Habitat: Water depth - wet to 11 cm; vegetative cover - bare to sparse
Migration Distance: Long
Migration Pattern: Narrow Band
Dispersion: Moderately dispersed to concentrated; 60% of total maximum sightings occur in 8 spring and 2 fall 0.1° lat-long blocks.
Six sites with highest counts: (see Appendix for more information)
Cheyenne Bottoms Wildlife Management Area, Kansas
Luck Lake, Saskatchewan
Quill Lakes, Saskatchewan
Porter Lake, Saskatchewan
Lake Thompson, South Dakota
Kingsbury County, South Dakota

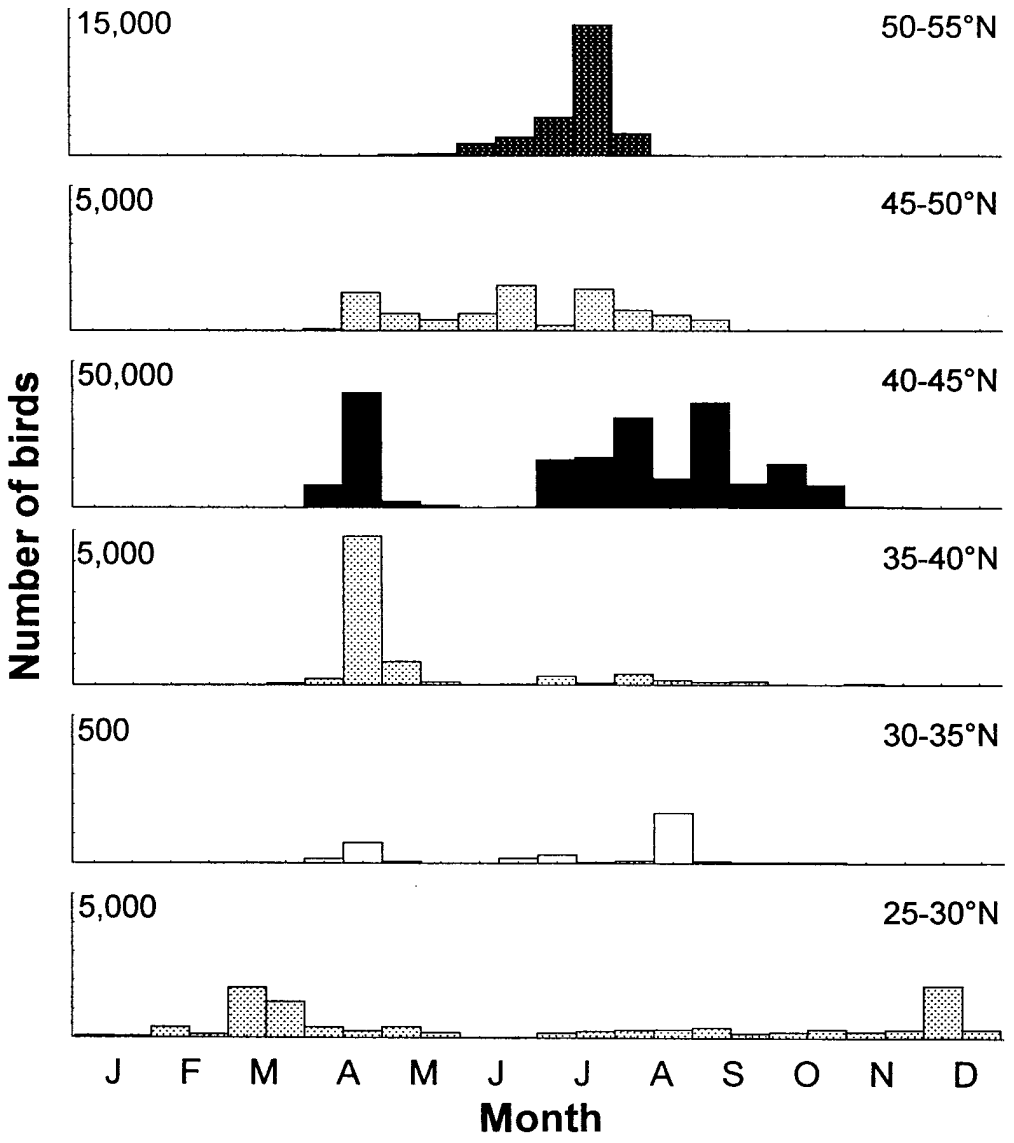


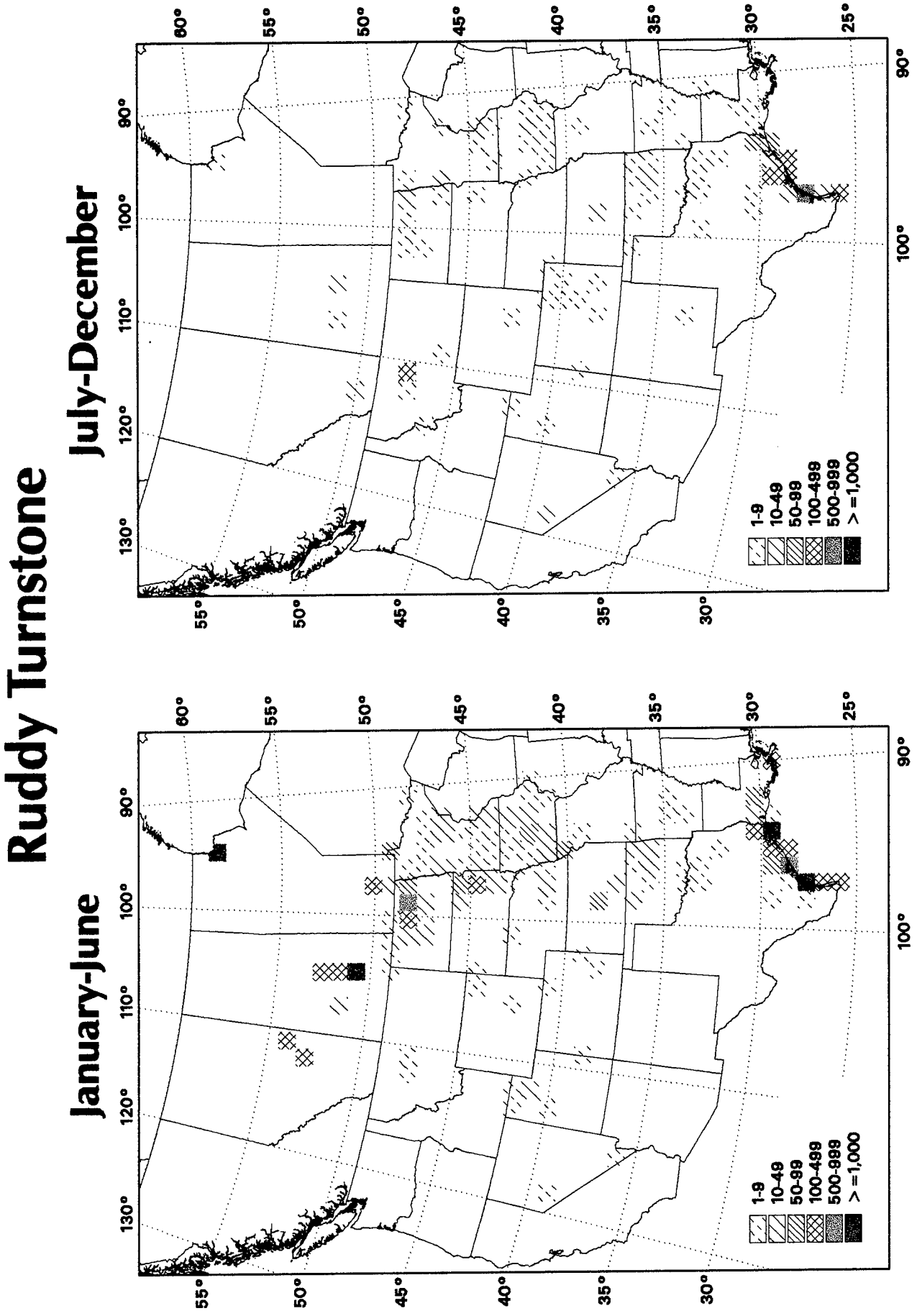
Marbled Godwit



Marbled Godwit *(Limosa fedoa)*

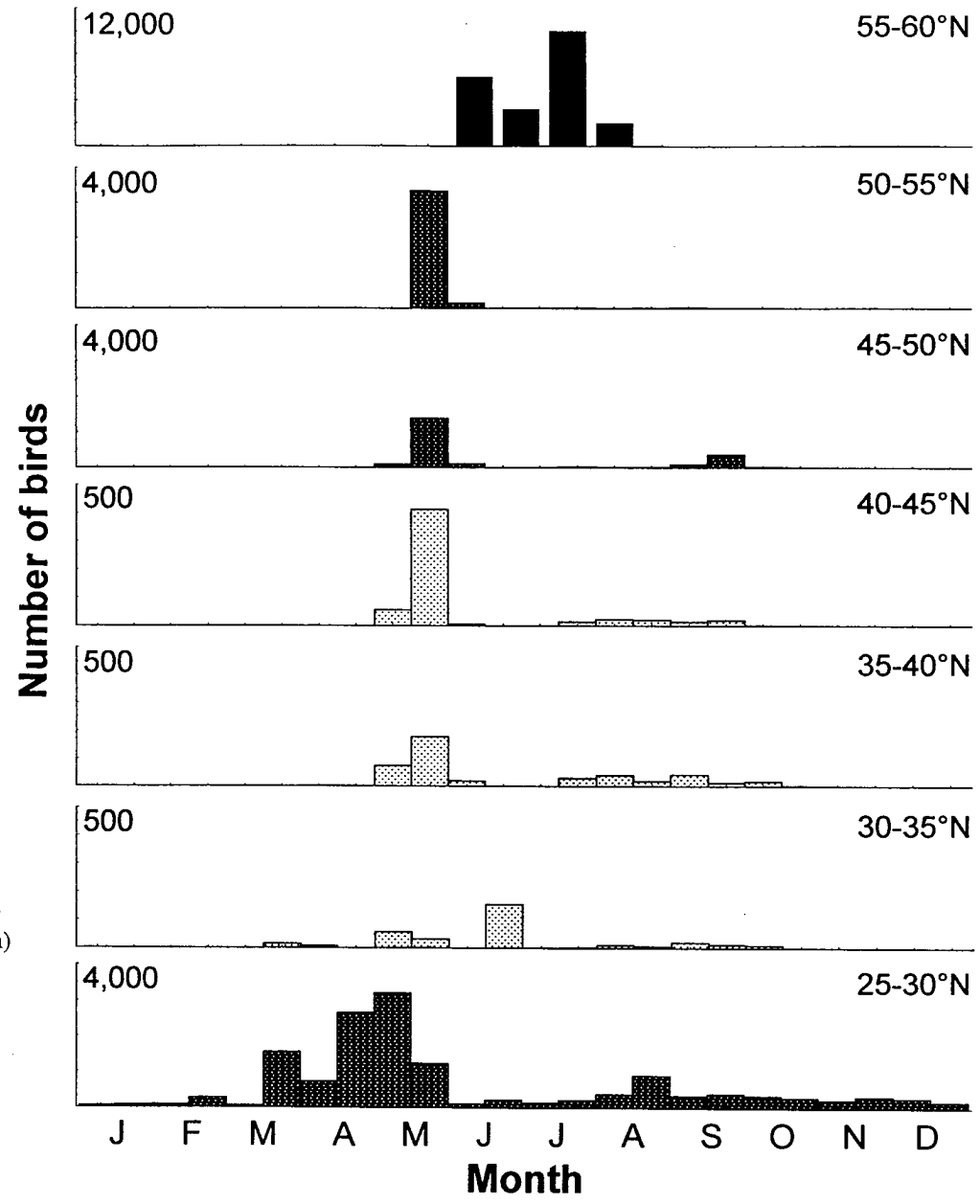
Body Size: Large
Foraging Guild: Aquatic prober
Foraging Habitat: Water depth - wet to 12 cm; vegetative cover - bare to sparse
Migration Distance: Short
Migration Pattern: Widespread
Dispersion: Moderately dispersed to concentrated; 60% of total maximum sightings occur in 13 spring and 11 fall 0.1° lat-long blocks.
Six sites with highest counts: (see Appendix for more information)
Great Salt Lake area, Utah
Luck Lake, Saskatchewan
Cheyenne Bottoms Wildlife Management Area, Kansas
Quill Lakes, Saskatchewan
Last Mountain Lake, Saskatchewan
Benton Lake National Wildlife Refuge, Montana



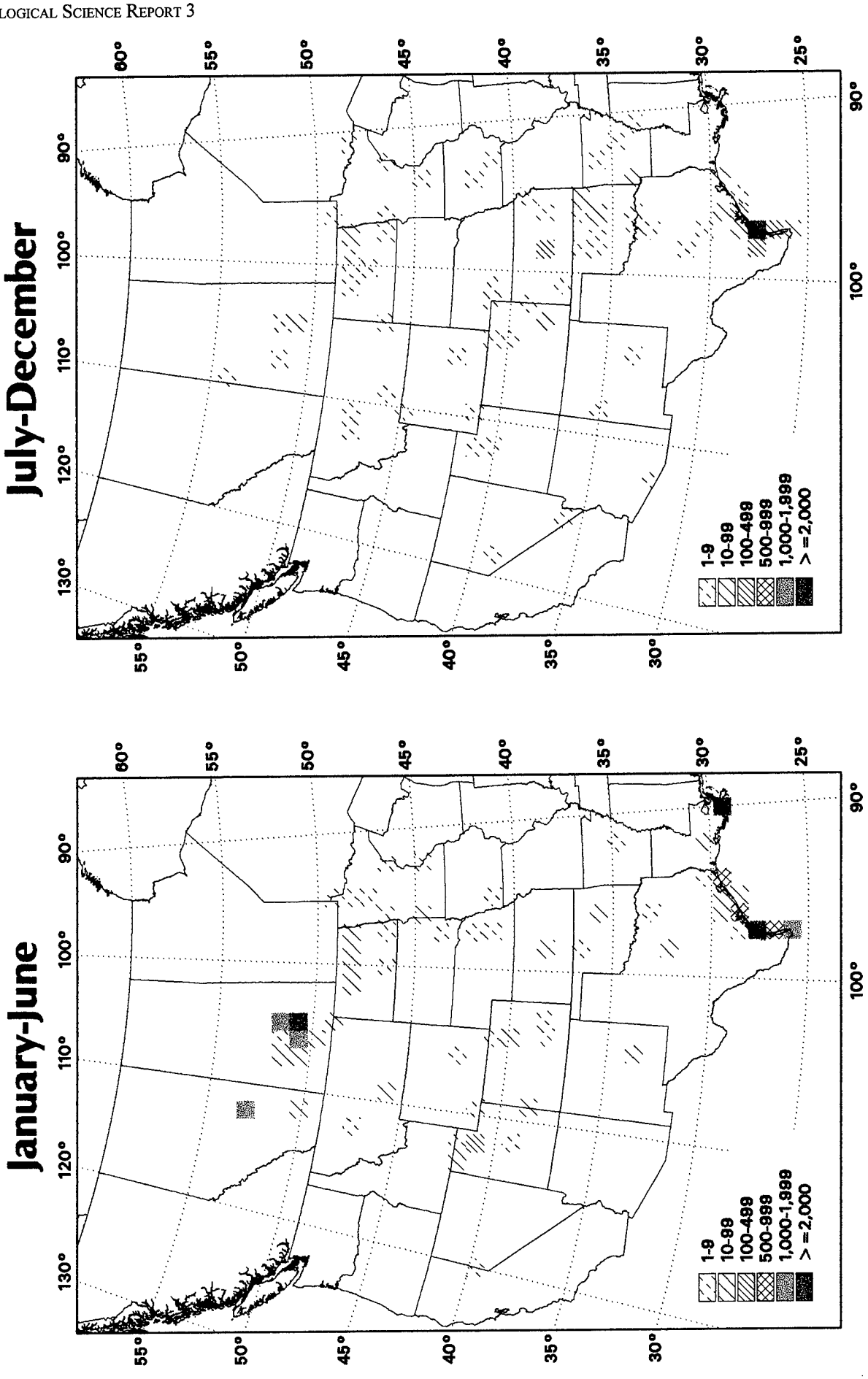

Ruddy Turnstone
January-June
July-December
1-9
10-49
50-99
100-499
500-999
> =1,000
60°
55°
50°
45°
40°
35°
30°
25°
130°
120°
110°
100°
90°

Ruddy Turnstone *(Arenaria interpres)*

Body Size: Medium
Foraging Guild: Terrestrial/aquatic gleaner/prober
Foraging Habitat: Water depth - dry to 5 cm; vegetative cover - bare to sparse
Migration Distance: Intermediate
Migration Pattern: Jump
Dispersion: Moderately dispersed; 60% of total maximum sightings occur in 3 spring and 6 fall 0.1° lat-long blocks.
Six sites with highest counts: (see Appendix for more information)
Churchill area, Manitoba
Last Mountain Lake, Saskatchewan
Padre Island National Seashore, Texas
Matagorda National Wildlife Refuge, Texas
Sewage ponds, Devil's Lake, North Dakota
Shore east of Bolivar Flats, Galveston Island, Texas

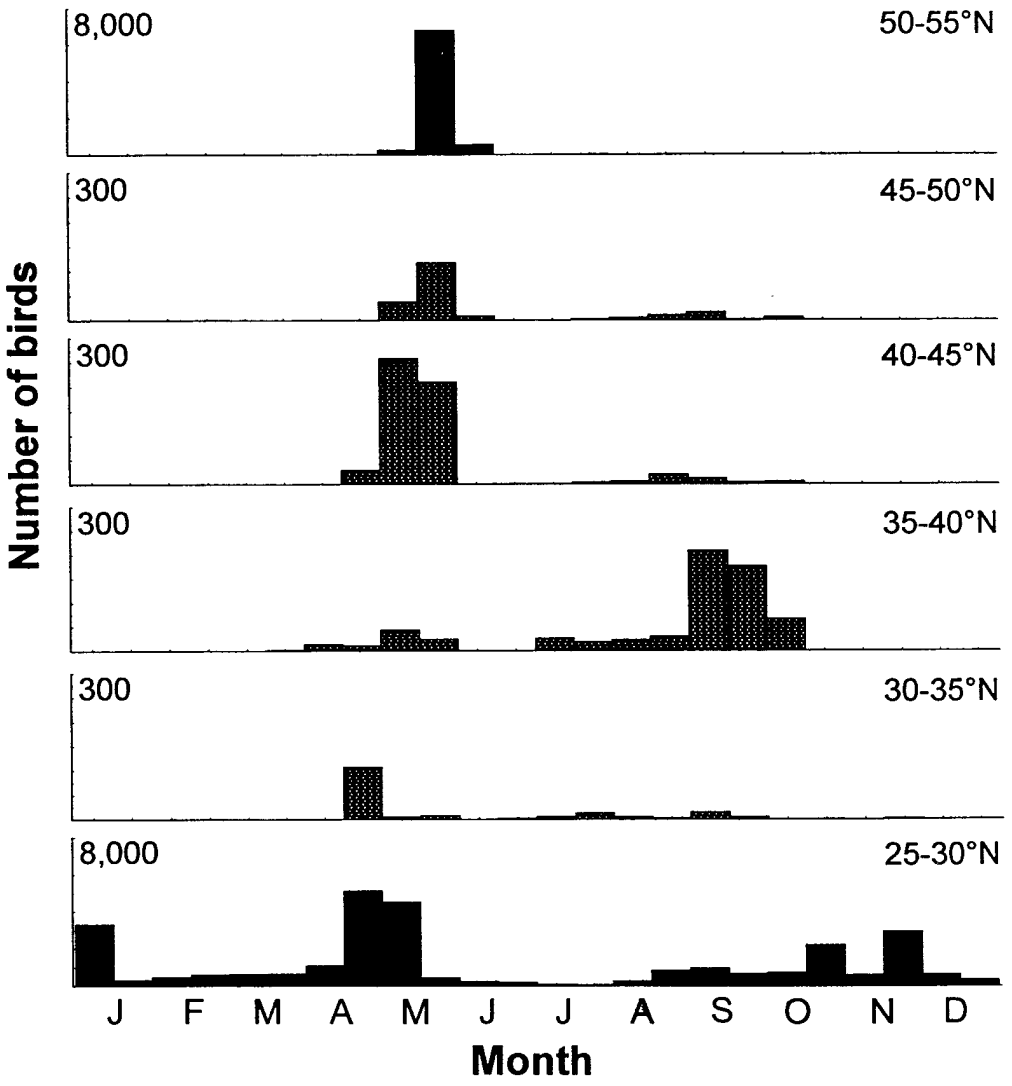


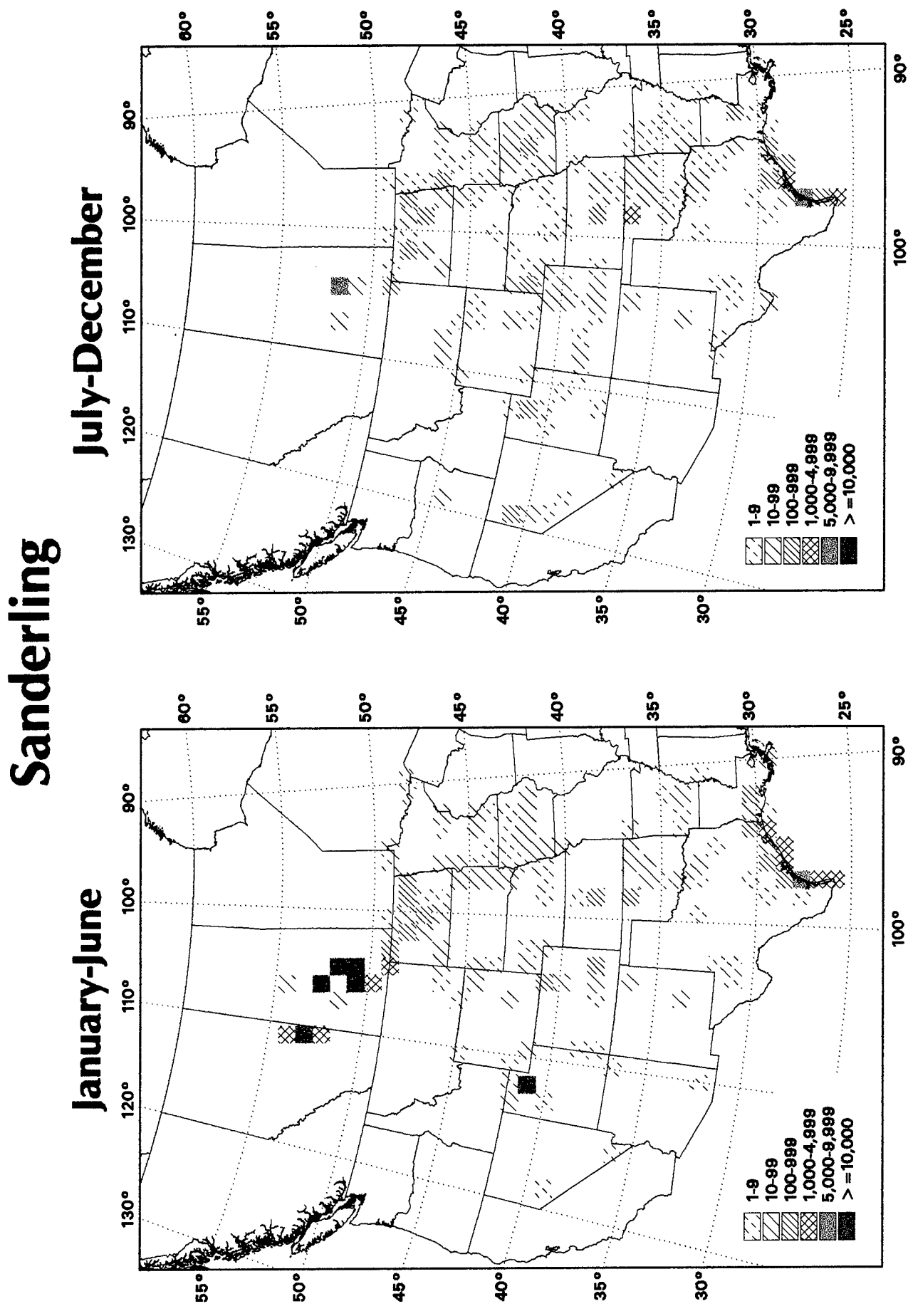
Red Knot


January-June
July-December
60°
55°
50°
45°
40°
35°
30°
25°
130°
120°
110°
100°
90°
1-9
10-99
100-499
500-999
1,000-1,999
> =2,000

Red Knot ***(Calidris canutus)***

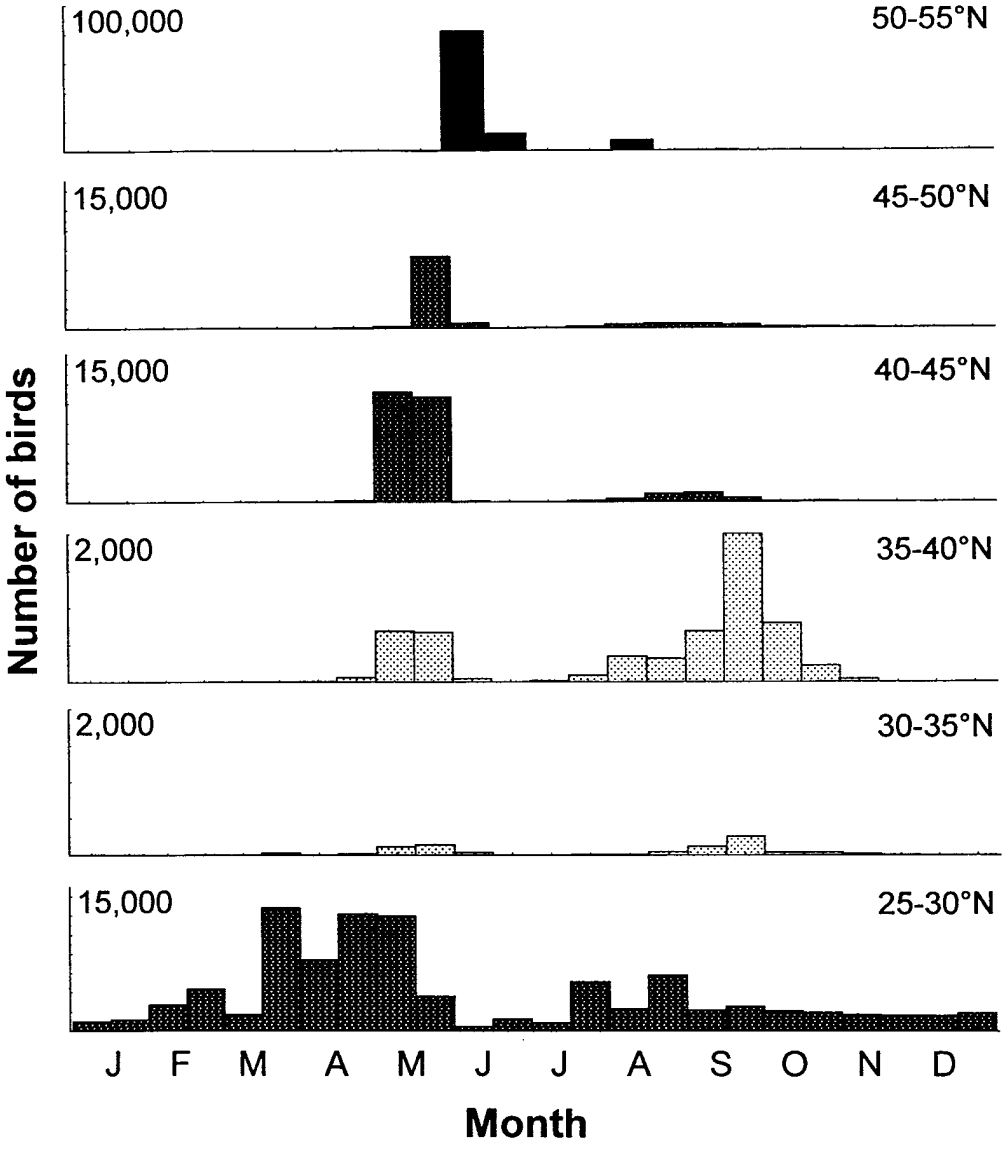
Body Size: Medium
Foraging Guild: Aquatic prober/gleaner
Foraging Habitat: Water depth - wet to 6 cm; vegetative cover - bare to sparse
Migration Distance: Intermediate
Migration Pattern: Jump
Dispersion: Moderately dispersed to concentrated; 60% of total maximum sightings occur in 5 spring and 2 fall 0.1° lat-long blocks.
Six sites with highest counts: (see Appendix for more informatio
Mustang Island Beach, Texas
Last Mountain Lake, Saskatchewan
Grand Terre, Jefferson Parish, Louisiana
Airport, Port Aransas, Texas
Quill Lakes, Saskatchewan
Chaplin Lakes, Saskatchewan

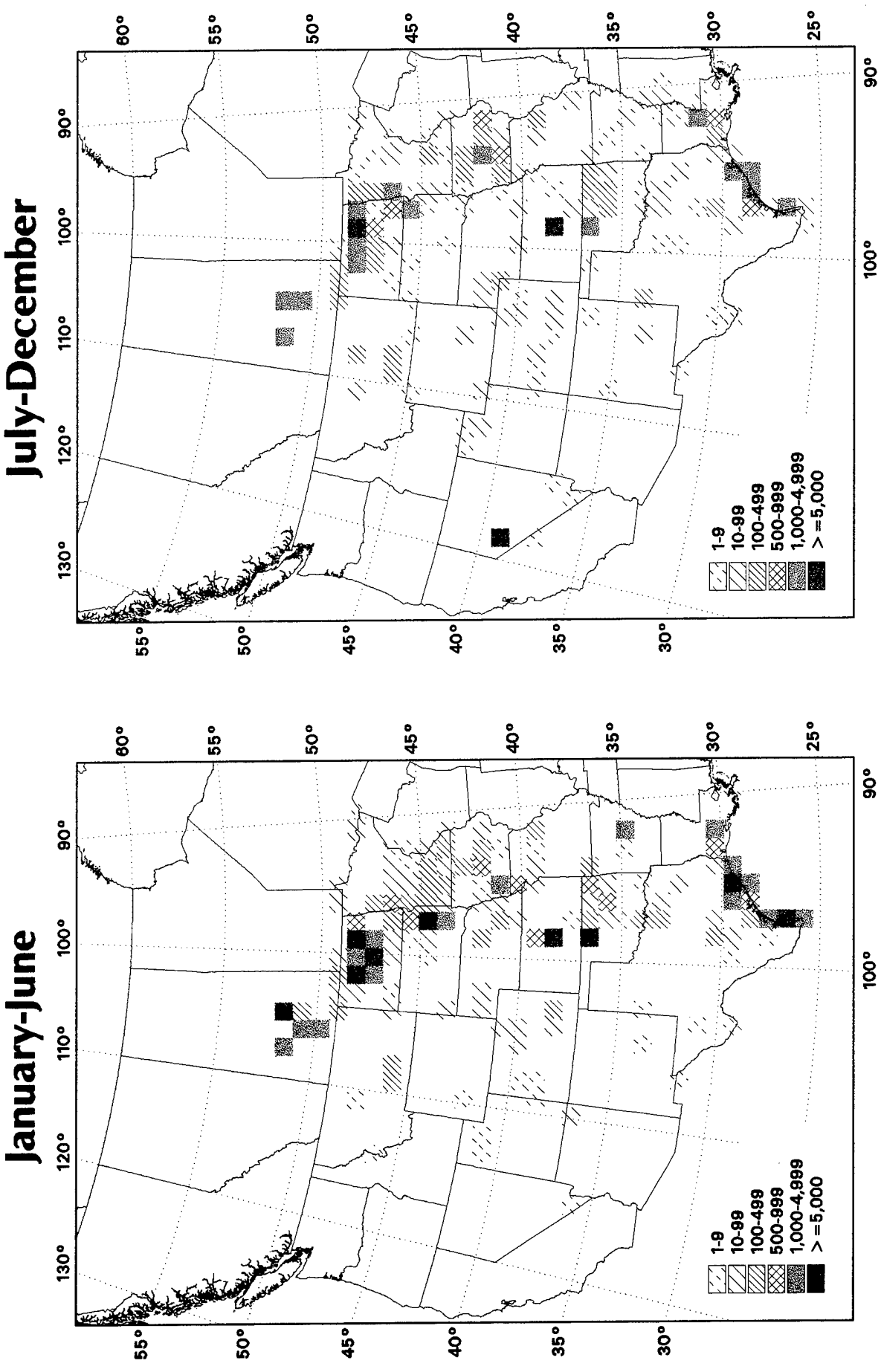



Sanderling
January-June
July-December
1-9
10-99
100-999
1,000-4,999
5,000-9,999
> =10,000
60°
55°
50°
45°
40°
35°
30°
25°
90°
100°
110°
120°
130°

Sanderling *(Calidris alba)*

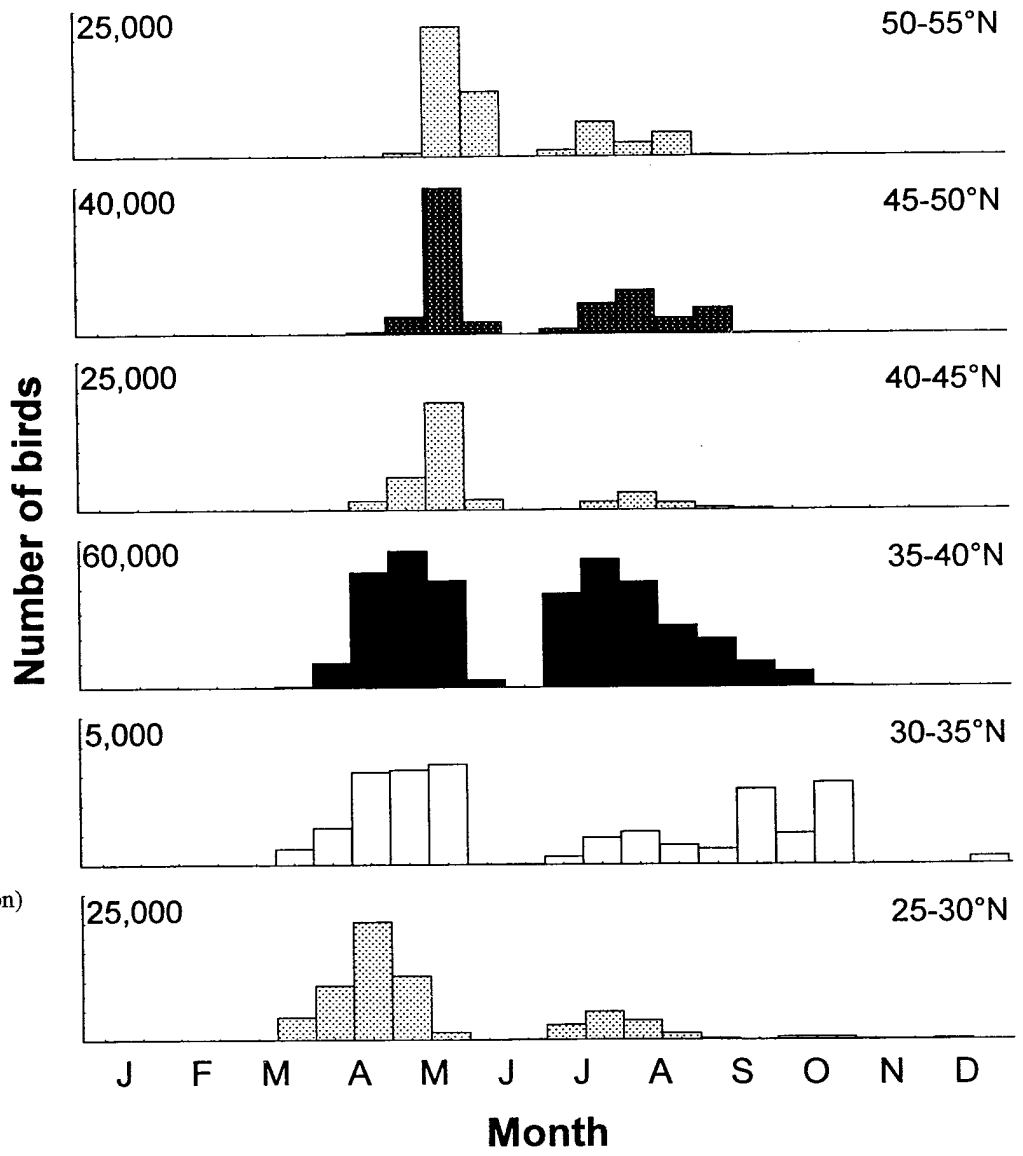
Body Size: Medium
Foraging Guild: Aquatic prober/gleaner
Foraging Habitat: Water depth - dry to 3 cm; vegetative cover - bare to sparse
Migration Distance: Intermediate
Migration Pattern: Jump
Dispersion: Moderately dispersed; 60% of total maximum sightings occur in 6 spring and 4 fall 0.1° lat-long blocks.
Six sites with highest counts: (see Appendix for more information
Quill Lakes, Saskatchewan
Reflex Lakes, Alberta
Chaplin Lakes, Saskatchewan
Great Salt Lake area, Utah
Last Mountain Lake, Saskatchewan
Blaine Lakes, Saskatchewan

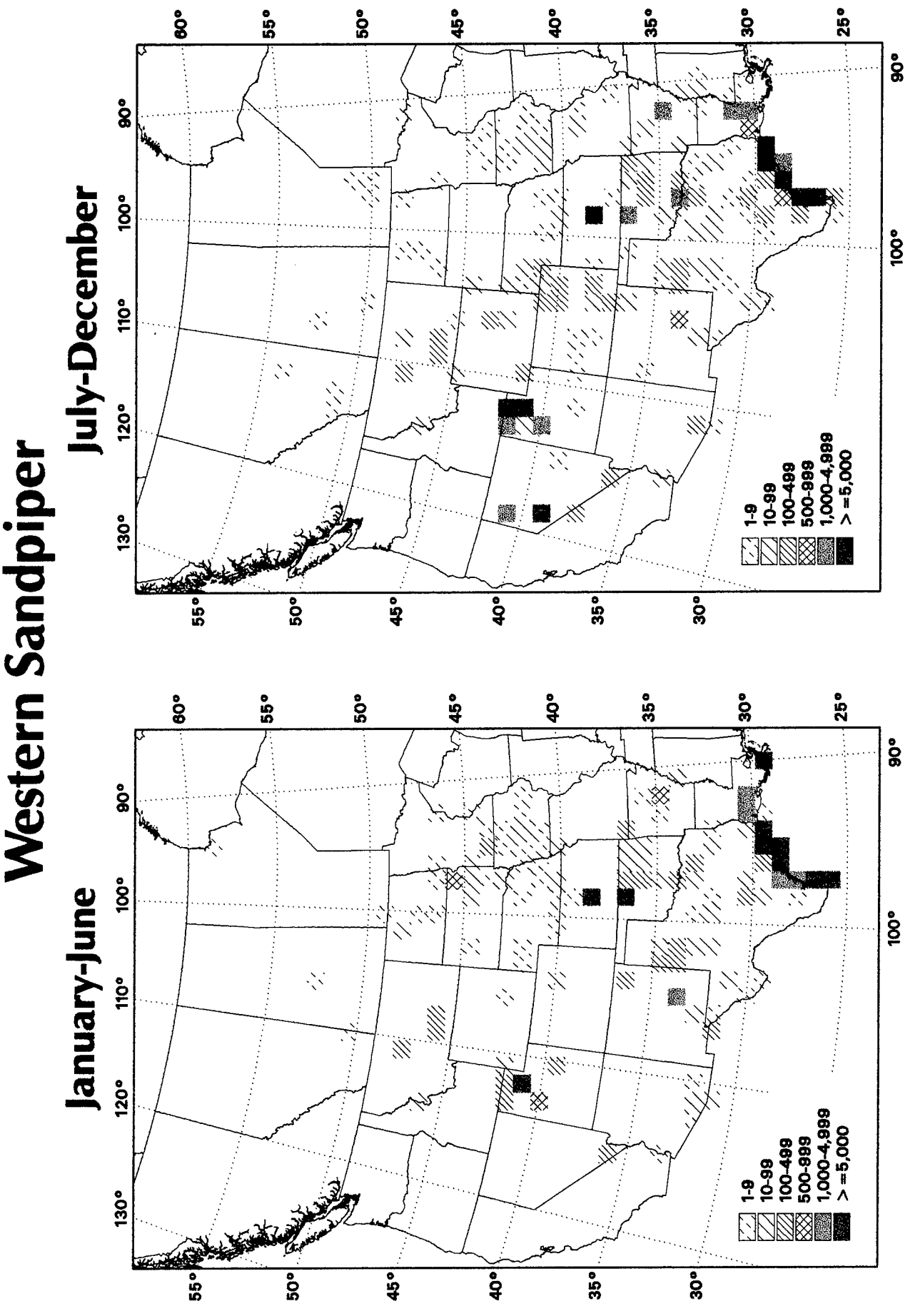



Semipalmated Sandpiper
January-June
July-December
1-9
10-99
100-499
500-999
1,000-4,999
> =5,000
130°
120°
110°
100°
90°
80°
60°
55°
50°
45°
40°
35°
30°
25°

Semipalmated Sandpiper ***(Calidris pusilla)***

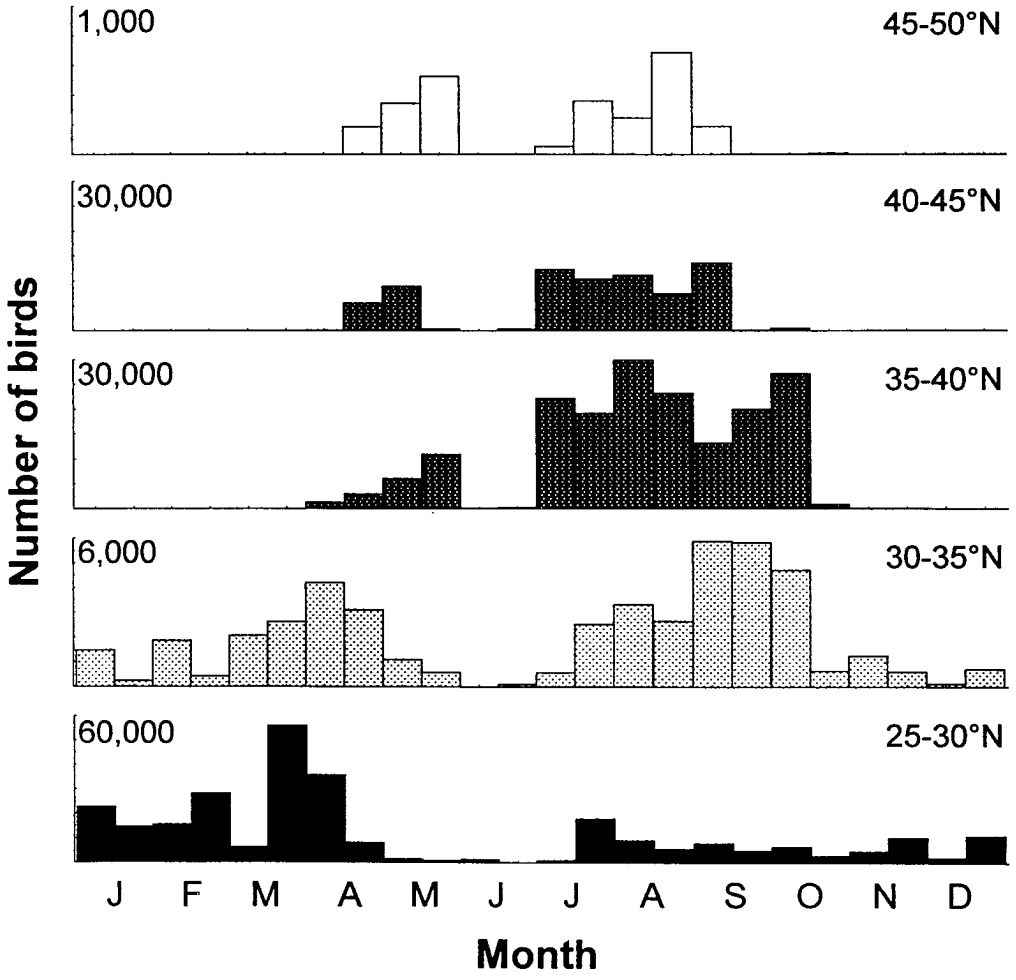
Body Size: Small
Foraging Guild: Aquatic prober/gleaner
Foraging Habitat: Water depth - wet to 4 cm; vegetative cover - bare to sparse
Migration Distance: Intermediate
Migration Pattern: Narrow Band
Dispersion: Moderately dispersed; 60% of total maximum sightings occur in 6 spring and 4 fall 0.1° lat-long blocks.
Six sites with highest counts: (see Appendix for more information)
Cheyenne Bottoms Wildlife Management Area, Kansas
Minnewaukan Flats, Devil's Lake, North Dakota
Quill Lakes, Saskatchewan
Salt Plains National Wildlife Refuge, Oklahoma
Dry Lake, Clark County, South Dakota
Laguna Atascosa National Wildlife Refuge, Texas

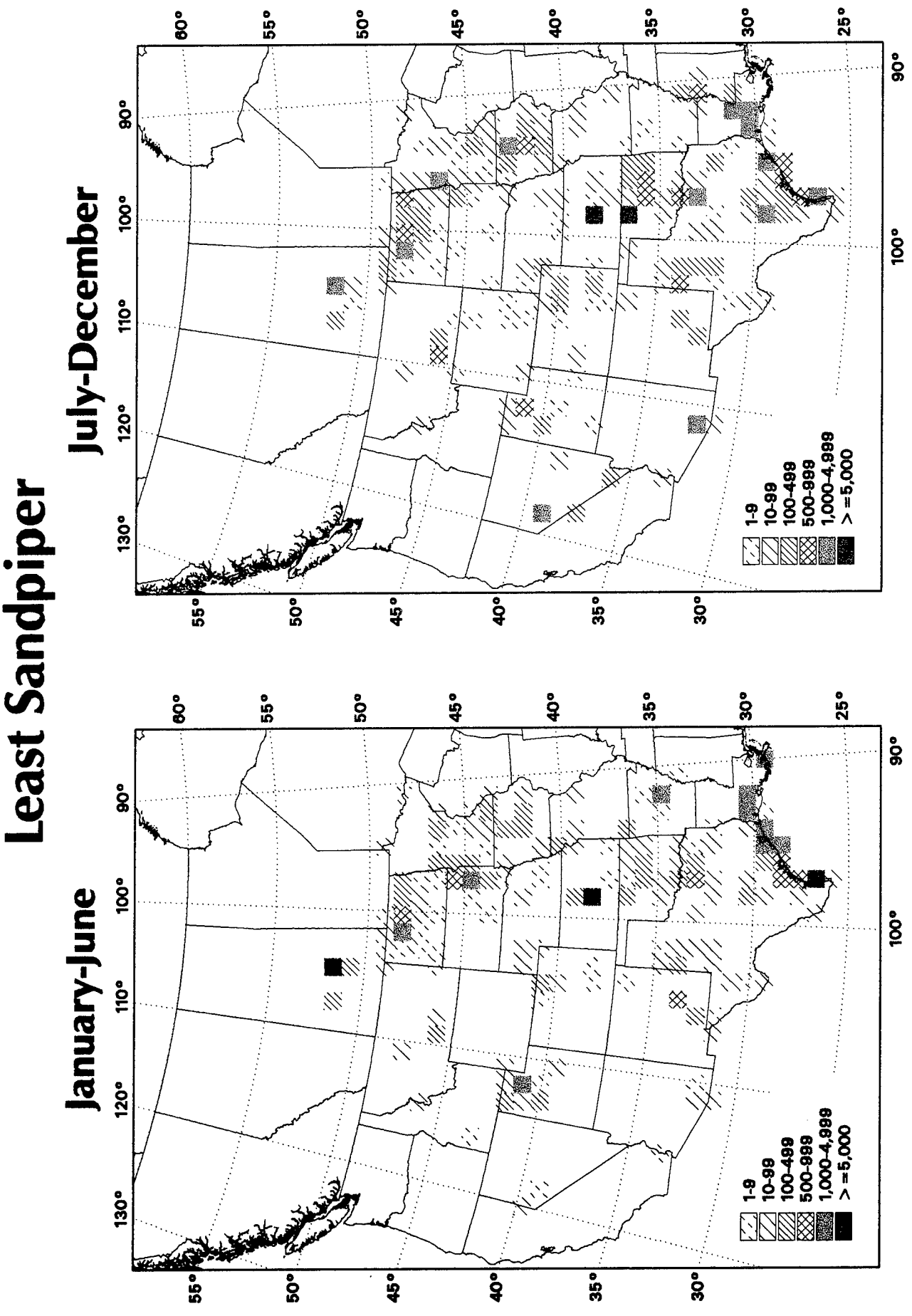



Western Sandpiper
January-June
July-December
1-9
10-99
100-499
500-999
1,000-4,999
> =5,000
60°
55°
50°
45°
40°
35°
30°
25°
90°
100°
110°
120°
130°

Western Sandpiper ***(Calidris mauri)***

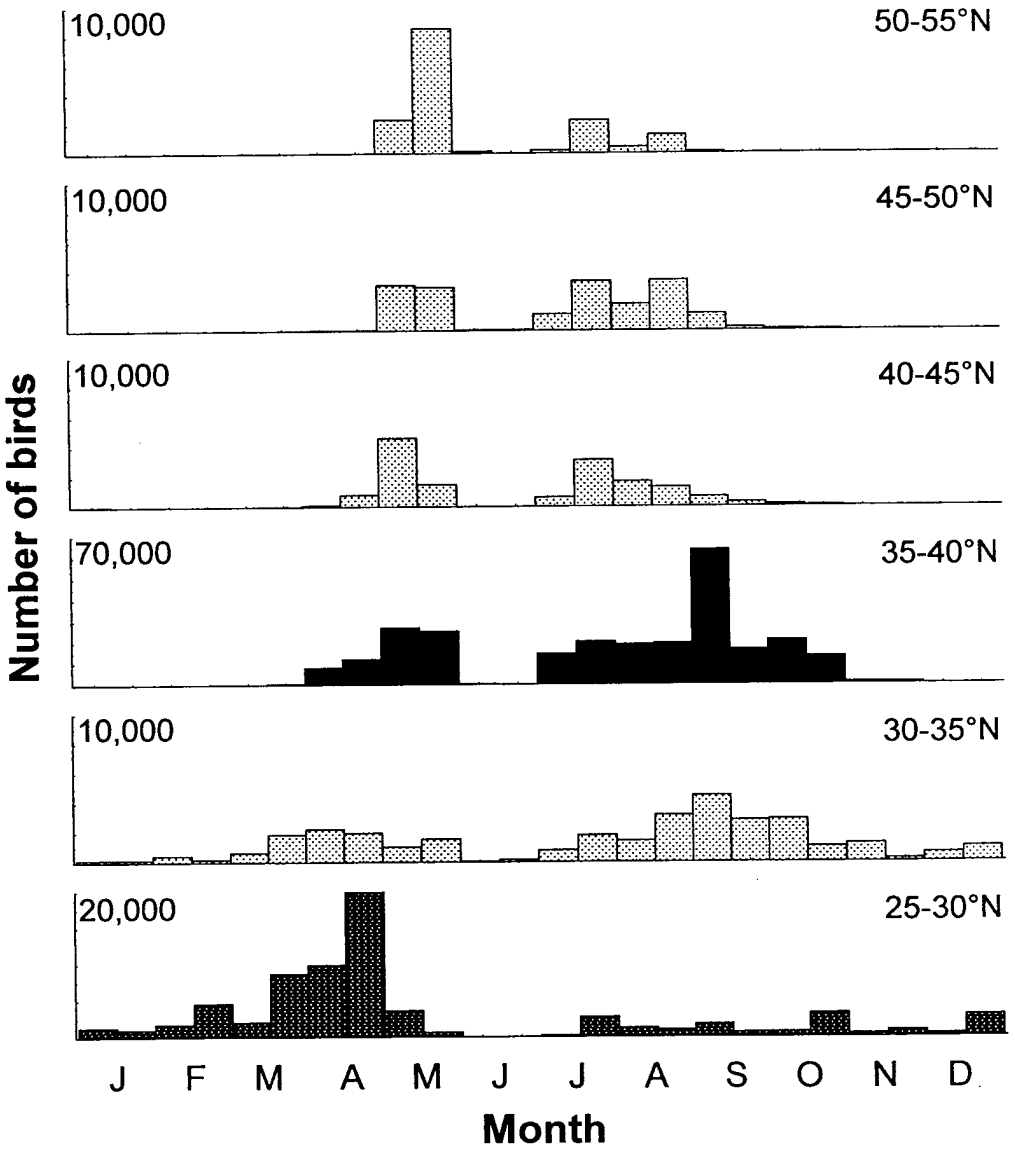
Body Size: Small
Foraging Guild: Aquatic prober/gleaner
Foraging Habitat: Water depth - wet to 5 cm; vegetative cover - bare to sparse
Migration Distance: Intermediate
Migration Pattern: Crossband
Dispersion: Moderately dispersed; 60% of total maximum sightings occur in 7 spring and 9 fall 0.1° lat-long blocks.
Six sites with highest counts: (see Appendix for more information)
Cheyenne Bottoms Wildlife Management Area, Kansas
Laguna Atascosa National Wildlife Refuge, Texas
Carson Lake, Nevada
Great Salt Lake area, Utah
Salt Plains National Wildlife Refuge, Oklahoma
Bolivar Flats, Galveston Island, Texas

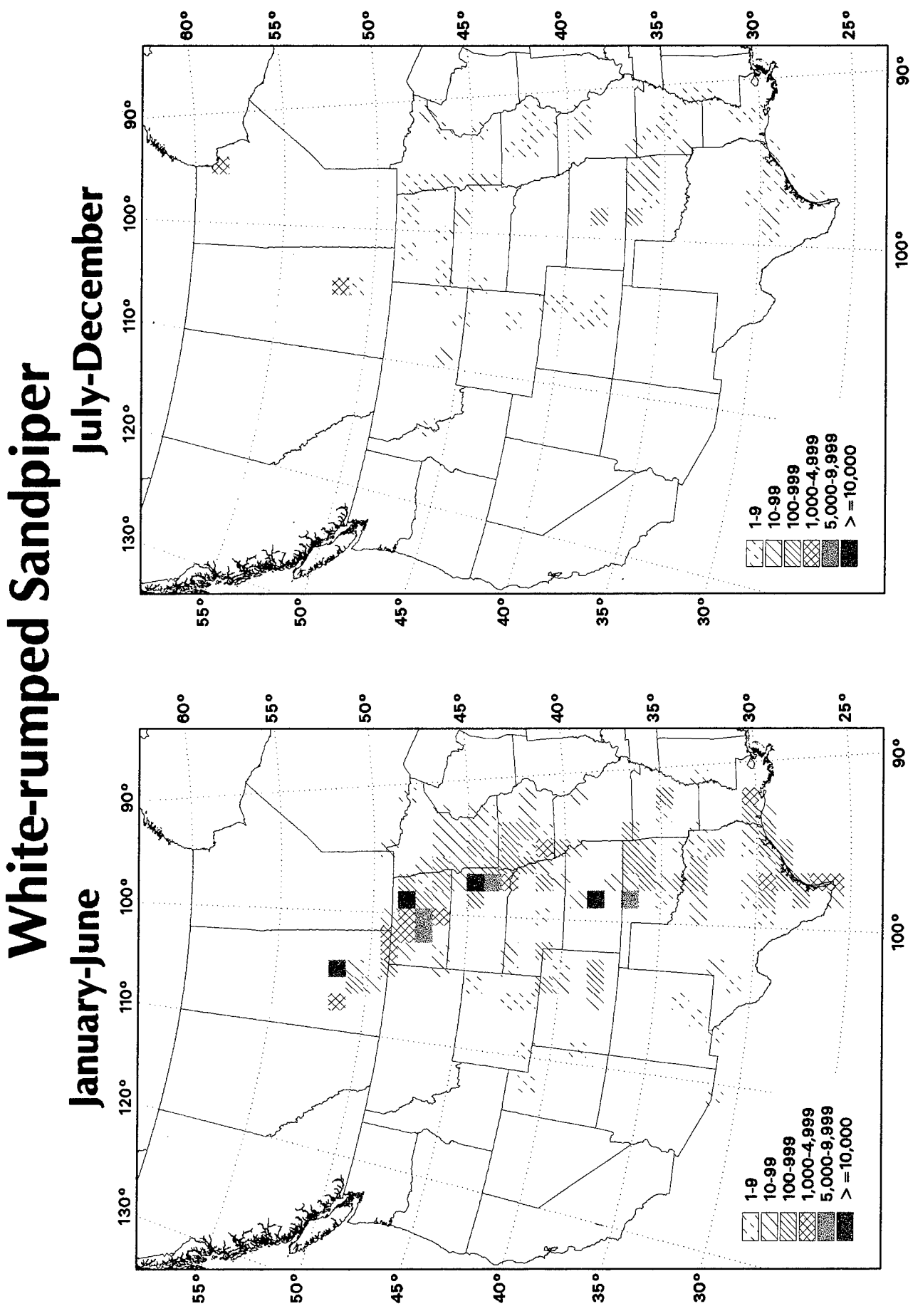



Least Sandpiper
January-June
July-December
1-9
10-99
100-499
500-999
1,000-4,999
> =5,000
60°
55°
50°
45°
40°
35°
30°
25°
130°
120°
110°
100°
90°

Least Sandpiper ***(Calidris minutilla)***

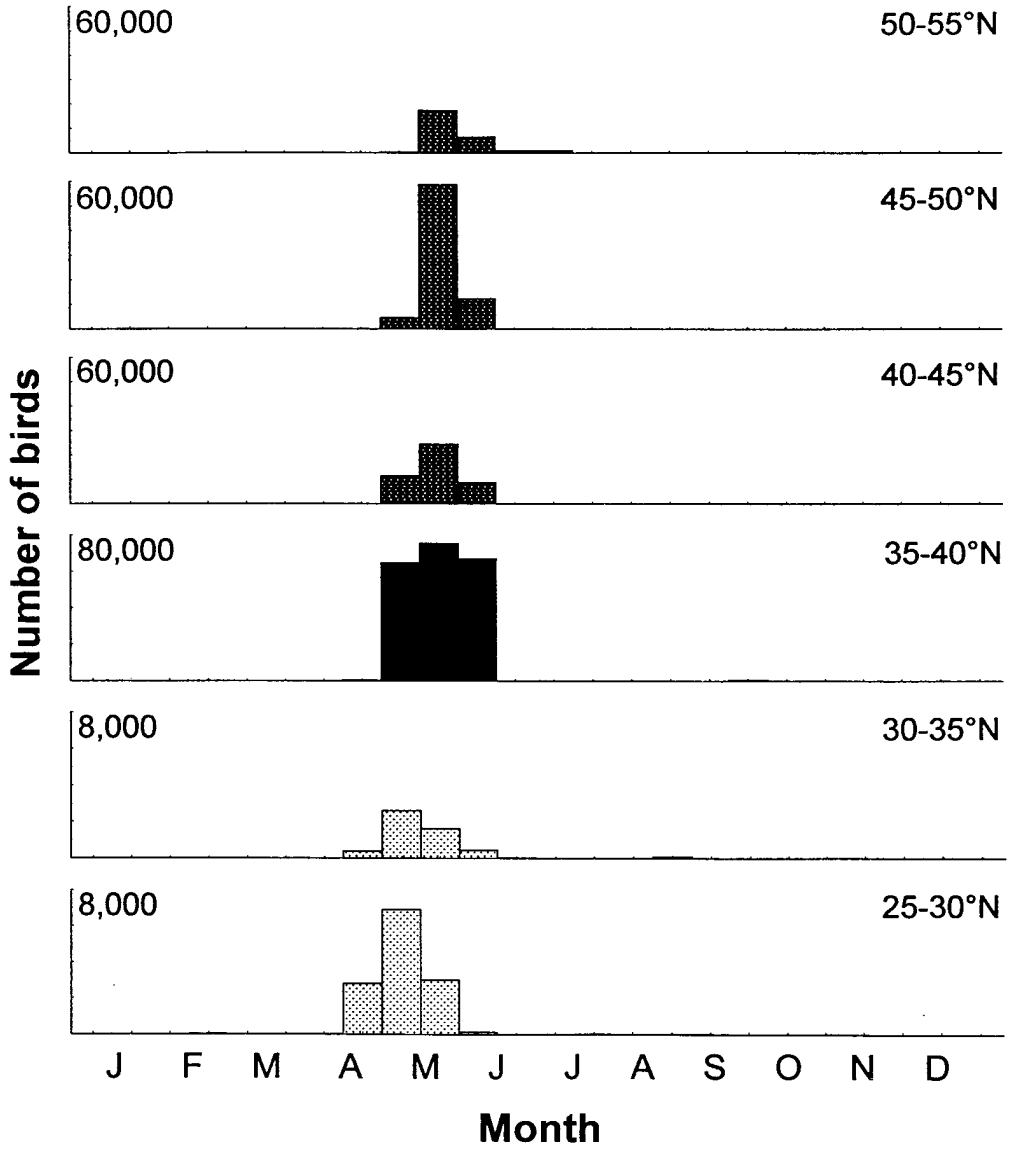
Body Size: Small
Foraging Guild: Aquatic prober/gleaner
Foraging Habitat: Water depth - wet to 4 cm; vegetative cover - bare to sparse
Migration Distance: Intermediate
Migration Pattern: Narrow band/widespread
Dispersion: Moderately dispersed; 60% of total maximum sightings occur in 4 spring and 3 fall 0.1° lat-long blocks.
Six sites with highest counts: (see Appendix for more information)
Cheyenne Bottoms Wildlife Management Area, Kansas
Laguna Atascosa National Wildlife Refuge, Texas
Salt Plains National Wildlife Refuge, Oklahoma
Quill Lakes, Saskatchewan
Brazoria National Wildlife Refuge, Texas
Great Salt Lake area, Utah

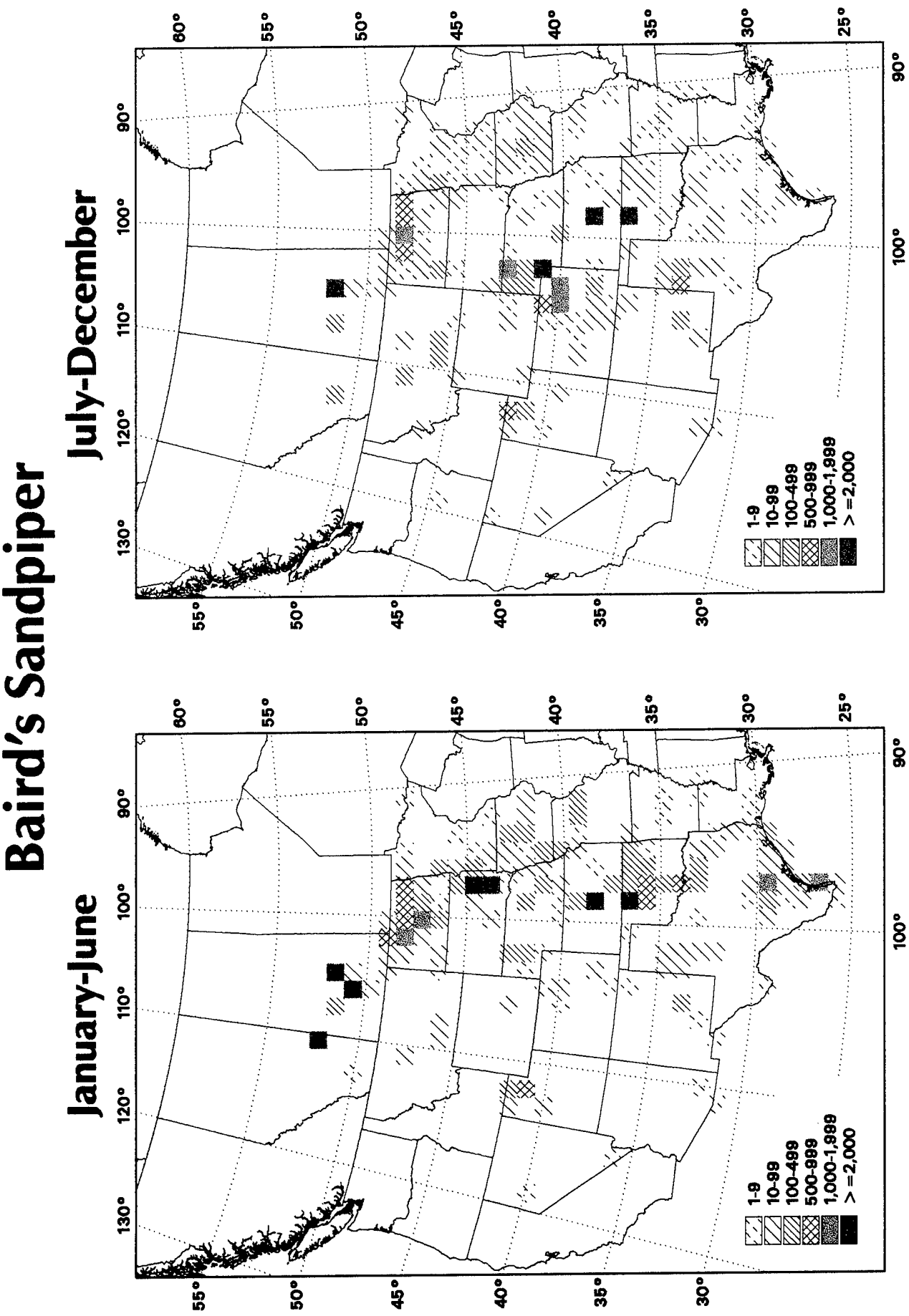



White-rumped Sandpiper
January-June
July-December
1-9
10-99
100-999
1,000-4,999
5,000-9,999
> = 10,000
60°
55°
50°
45°
40°
35°
30°
25°
90°
100°
110°
120°
130°

White-rumped Sandpiper ***(Calidris fuscicollis)***

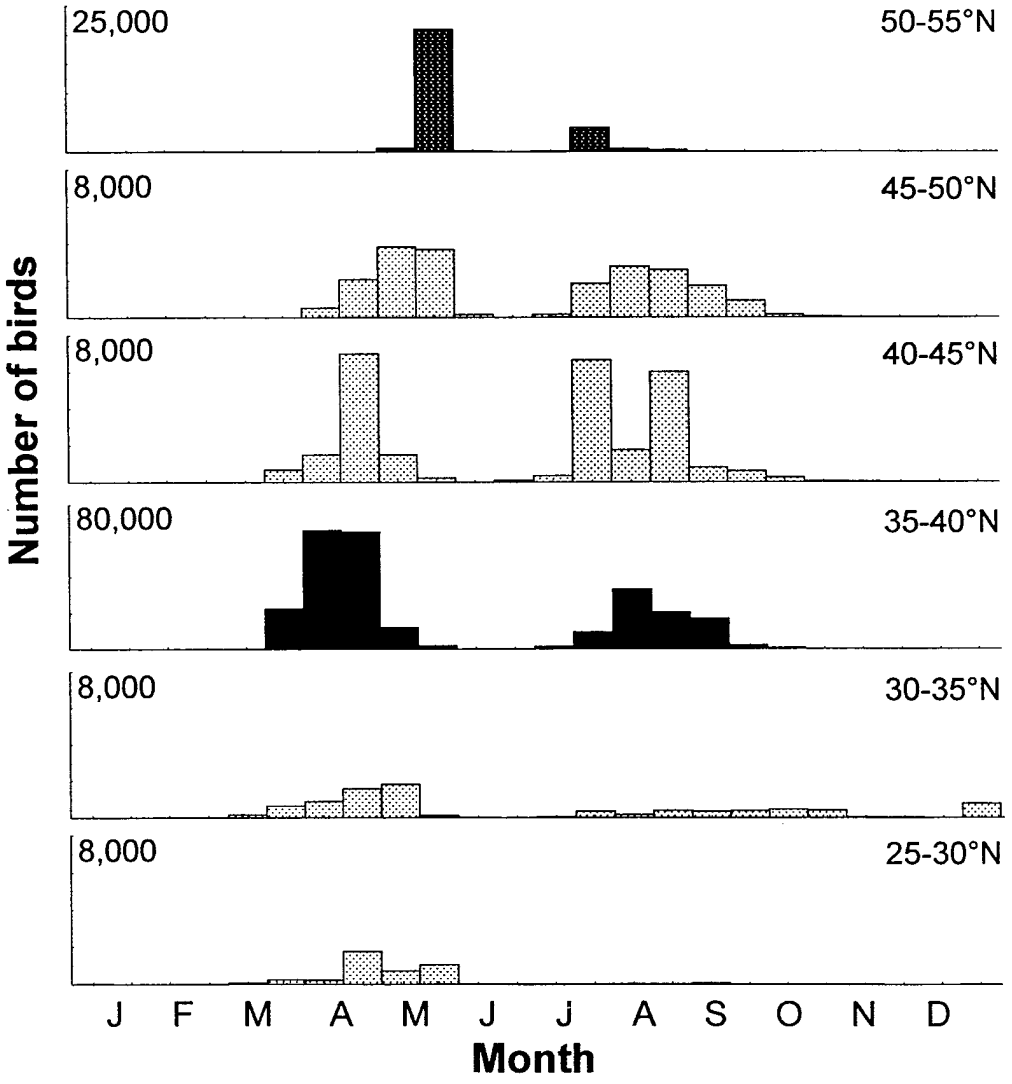
Body Size: Small
Foraging Guild: Aquatic prober/gleaner
Foraging Habitat: Water depth - wet to 5 cm; vegetative cover - bare to sparse
Migration Distance: Long
Migration Pattern: Narrow Band
Dispersion: Moderately dispersed; 60% of total maximum sightings occur in 7 0.1° lat-long blocks in spring.
Six sites with highest counts: (see Appendix for more information)
Cheyenne Bottoms Wildlife Management Area, Kansas
Minnewaukan Flats, Devil's Lake, North Dakota
Quill Lakes, Saskatchewan
Dry Lake, Clark County, South Dakota
Salt Plains National Wildlife Refuge, Oklahoma
Sheyenne Lake, North Dakota



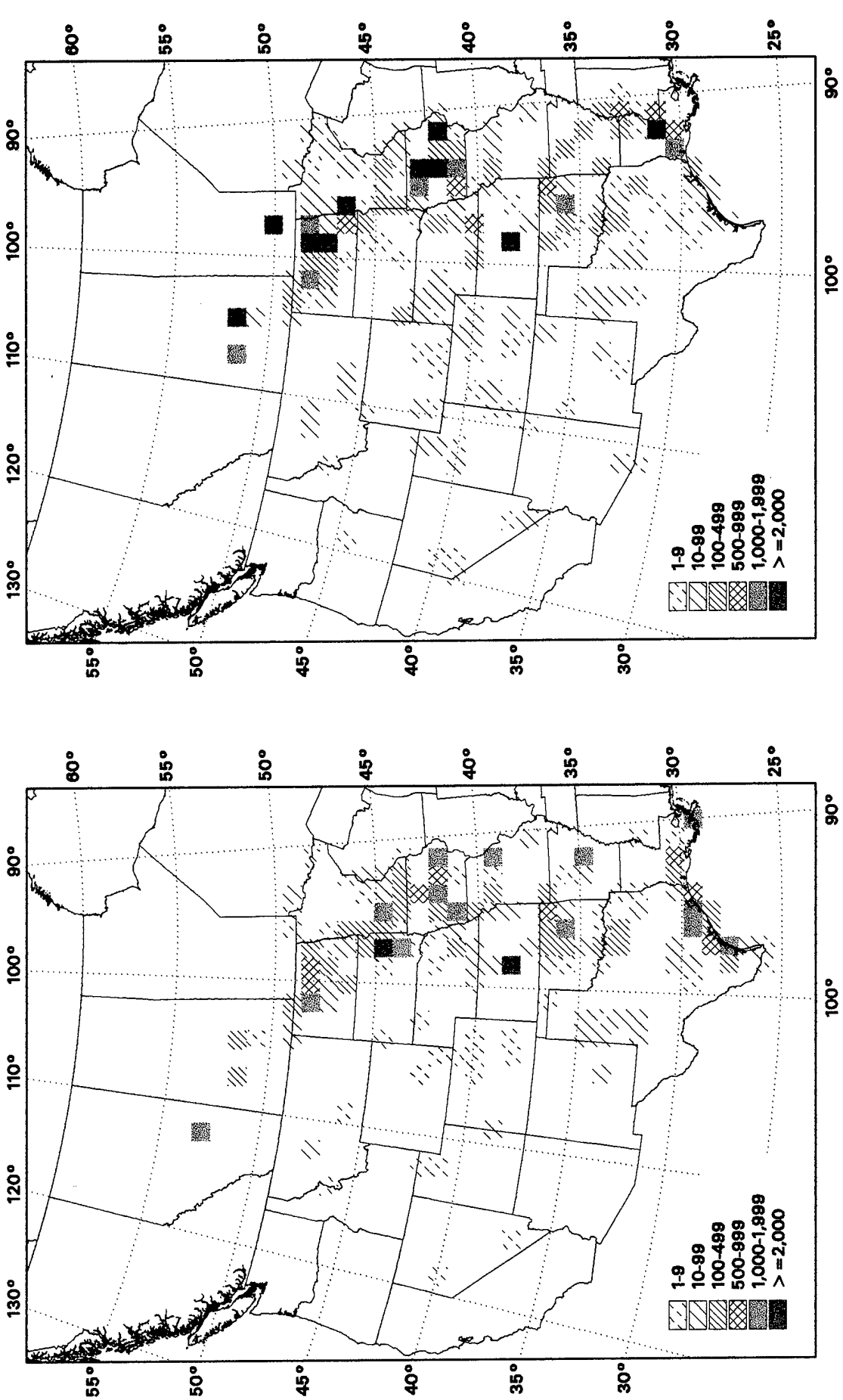

Baird's Sandpiper
January-June
July-December
1-9
10-99
100-499
500-999
1,000-1,999
> =2,000
60°
55°
50°
45°
40°
35°
30°
25°
130°
120°
110°
100°
90°

Baird's Sandpiper ***(Calidris bairdii)***

Body Size: Small
Foraging Guild: Aquatic prober/gleaner
Foraging Habitat: Water depth - wet to 5 cm; vegetative cover - bare to sparse
Migration Distance: Long
Migration Pattern: Narrow Band
Dispersion: Concentrated; 60% of total maximum sightings occur in 3 spring and 2 fall 0.1° lat-long blocks.
Six sites with highest counts: (see Appendix for more information)
Cheyenne Bottoms Wildlife Management Area, Kansas
Chaplin Lakes, Saskatchewan
Metiskow Lake Alberta
Lake McConaughy, Nebraska
Quill Lakes, Saskatchewan
Salt Plains National Wildlife Refuge, Oklahoma

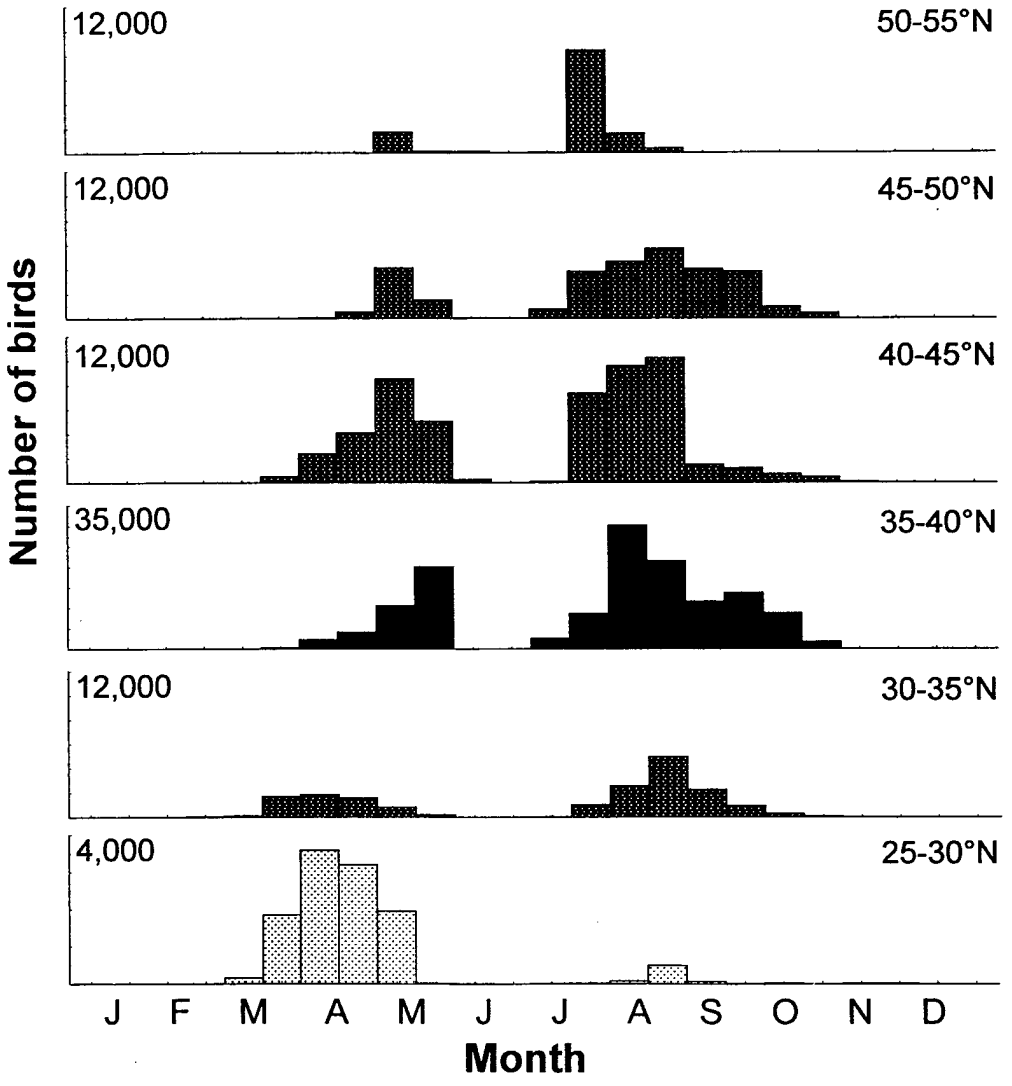


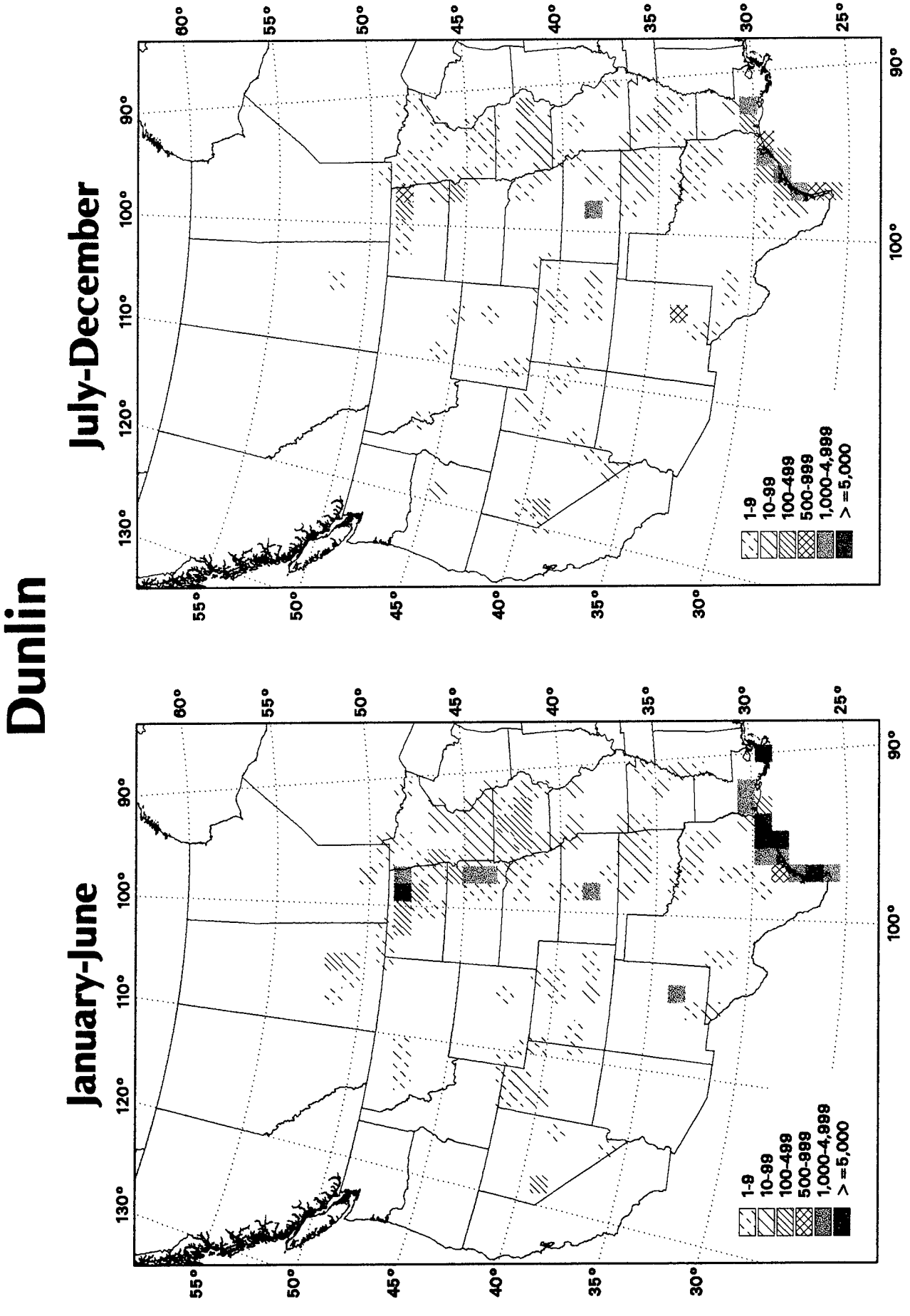
Pectoral Sandpiper



Pectoral Sandpiper ***(Calidris melanotos)***

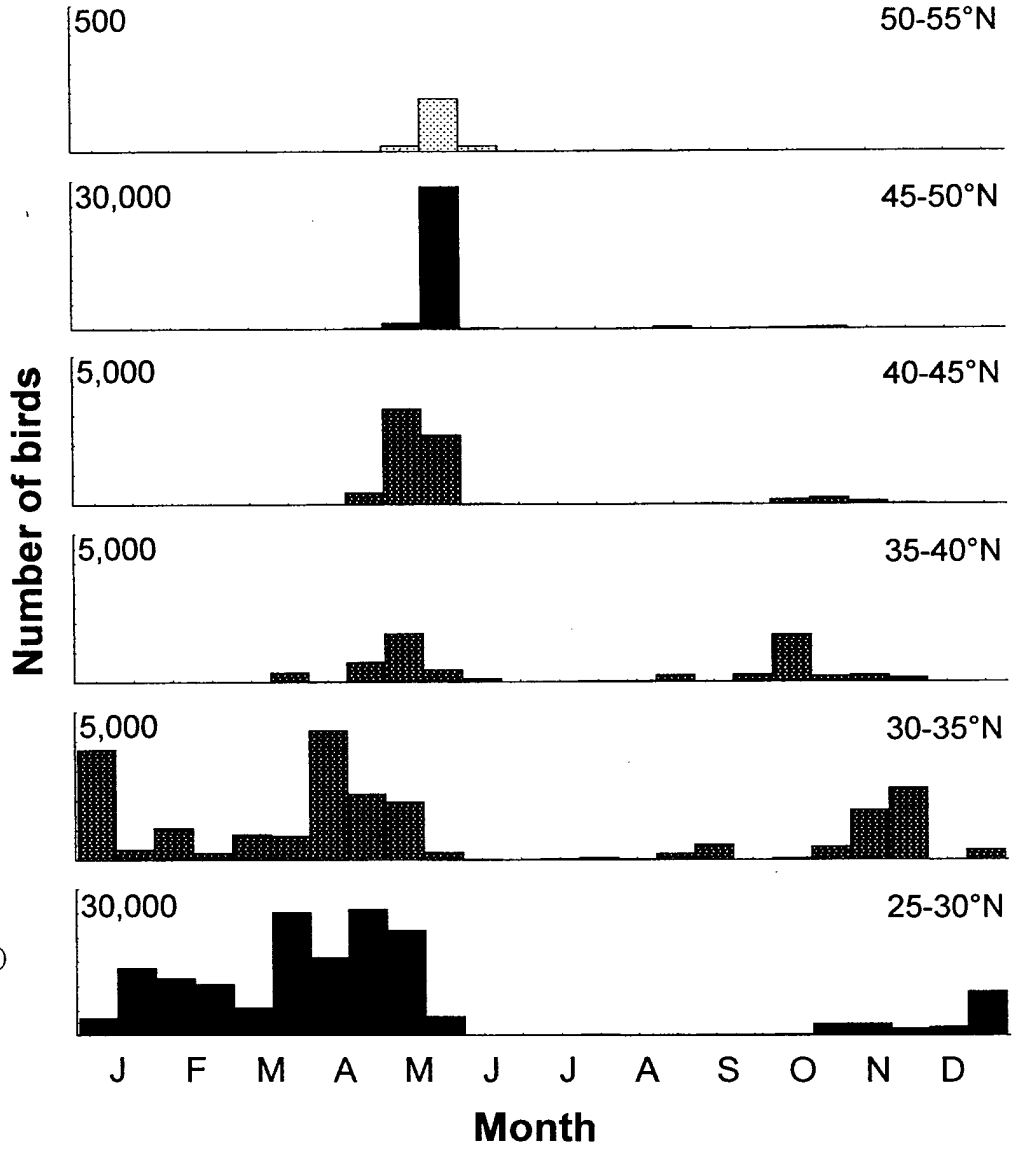
Body Size: Medium
Foraging Guild: Aquatic prober/gleaner
Foraging Habitat: Water depth - wet to 6 cm; vegetative cover - bare to sparse
Migration Distance: Long
Migration Pattern: Narrow Band
Dispersion: Broadly to moderately dispersed; 60% of total maximum sightings occur in 11 spring and 7 fall 0.1° lat-long blocks.
Six sites with highest counts: (see Appendix for more information)
Cheyenne Bottoms Wildlife Management Area, Kansas
Quill Lakes, Saskatchewan
Union Slough National Wildlife Refuge, Iowa
North Dakota State University, Fargo, North Dakota
Dry Lake, Clark County, South Dakota
Coralville Reservoir, Johnson County, Iowa

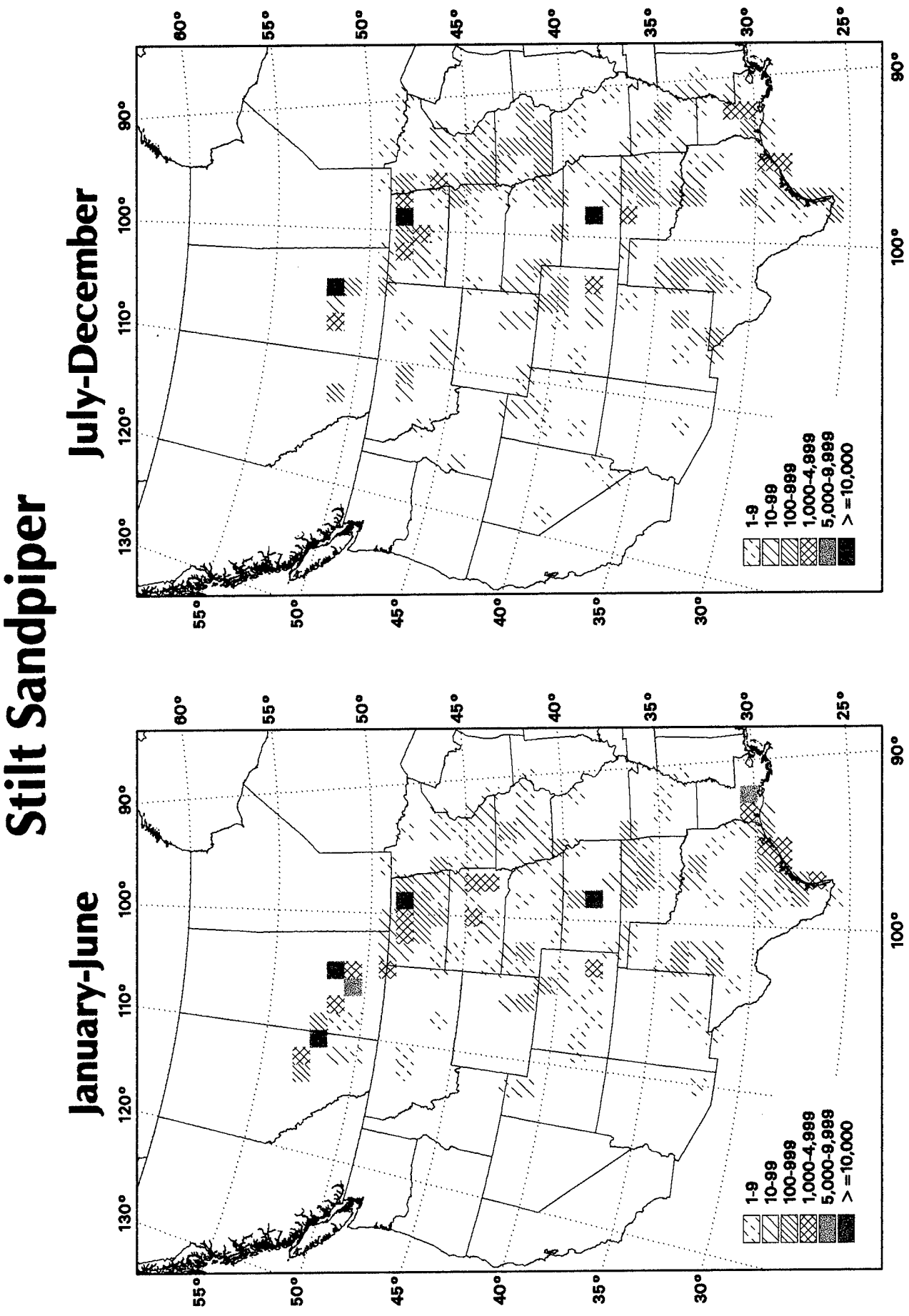



Dunlin
January-June
July-December
1-9
10-99
100-499
500-999
1,000-4,999
> =5,000
60°
55°
50°
45°
40°
35°
30°
25°
90°
100°
110°
120°
130°

Dunlin *(Calidris alpina)*

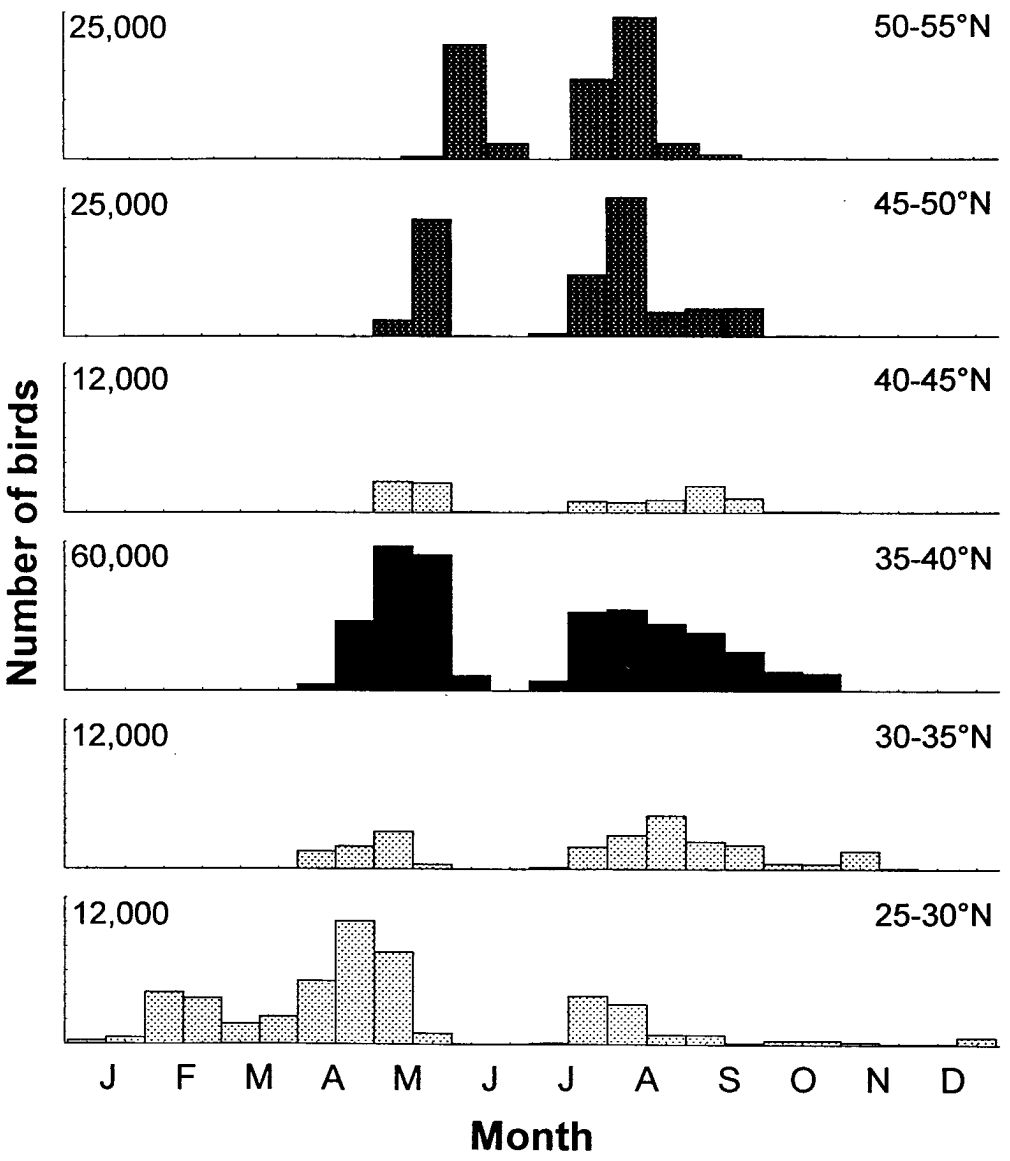
Body Size: Medium
Foraging Guild: aquatic prober/gleaner
Foraging Habitat: Water depth - wet to 6 cm; vegetative cover - bare to sparse
Migration Distance: Intermediate
Migration Pattern: Jump
Dispersion: Moderately dispersed; 60% of total maximum sightings occur in 7 spring and 6 fall 0.1° lat-long blocks.
Six sites with highest counts: (see Appendix for more information)
Minnewaukan Flats, Devil's Lake, North Dakota
Laguna Atascosa National Wildlife Refuge, Texas
Grand Terre, Jefferson Parish, Louisiana
Brazoria National Wildlife Refuge, Texas
Bolivar Flats, Galveston Island, Texas
Between Duson and Crowley, Louisiana

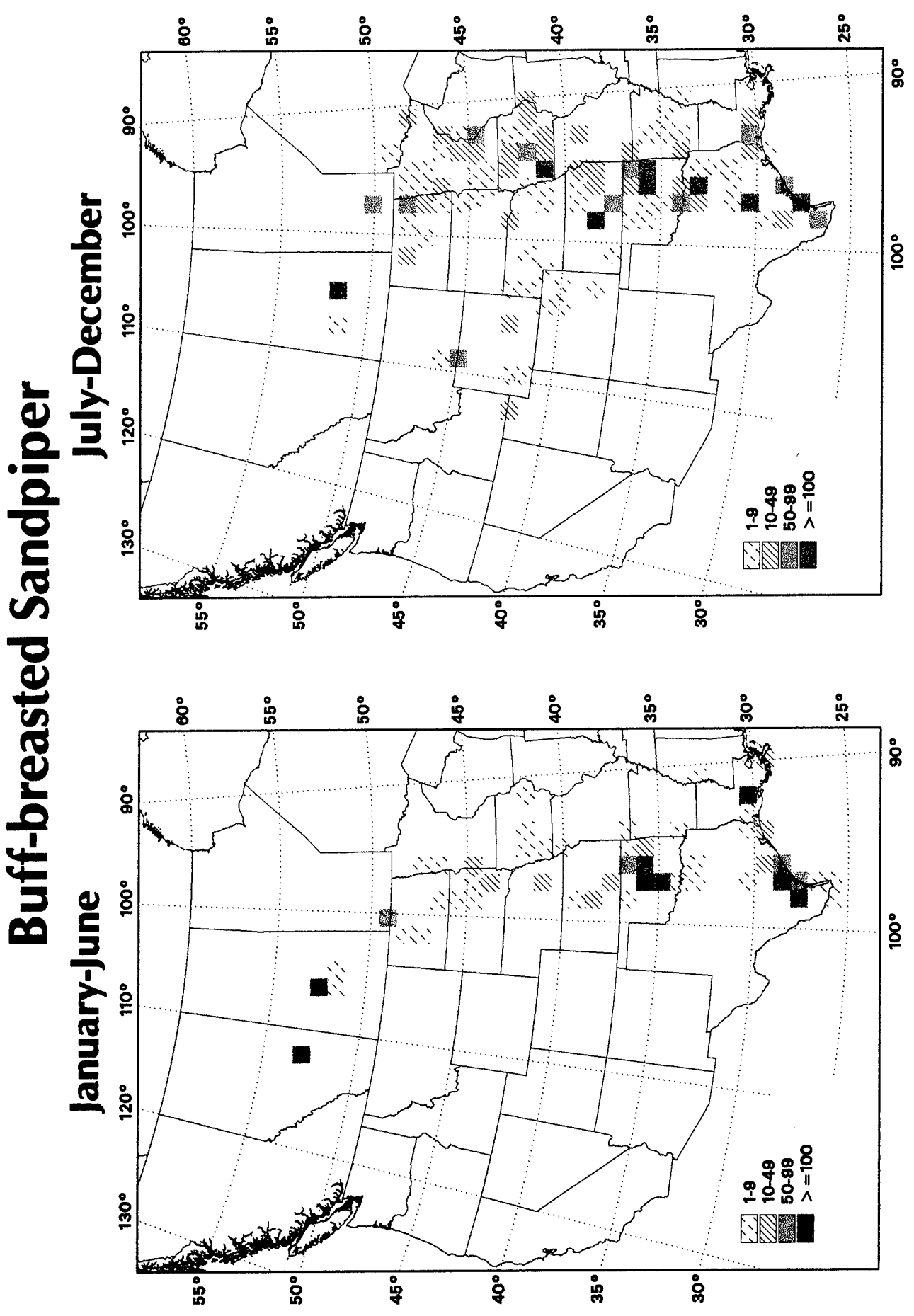



Stilt Sandpiper
January-June
July-December
1-9
10-99
100-999
1,000-4,999
5,000-9,999
> =10,000
60°
55°
50°
45°
40°
35°
30°
25°
90°
100°
110°
120°
130°

Stilt Sandpiper ***(Calidris himantopus)***

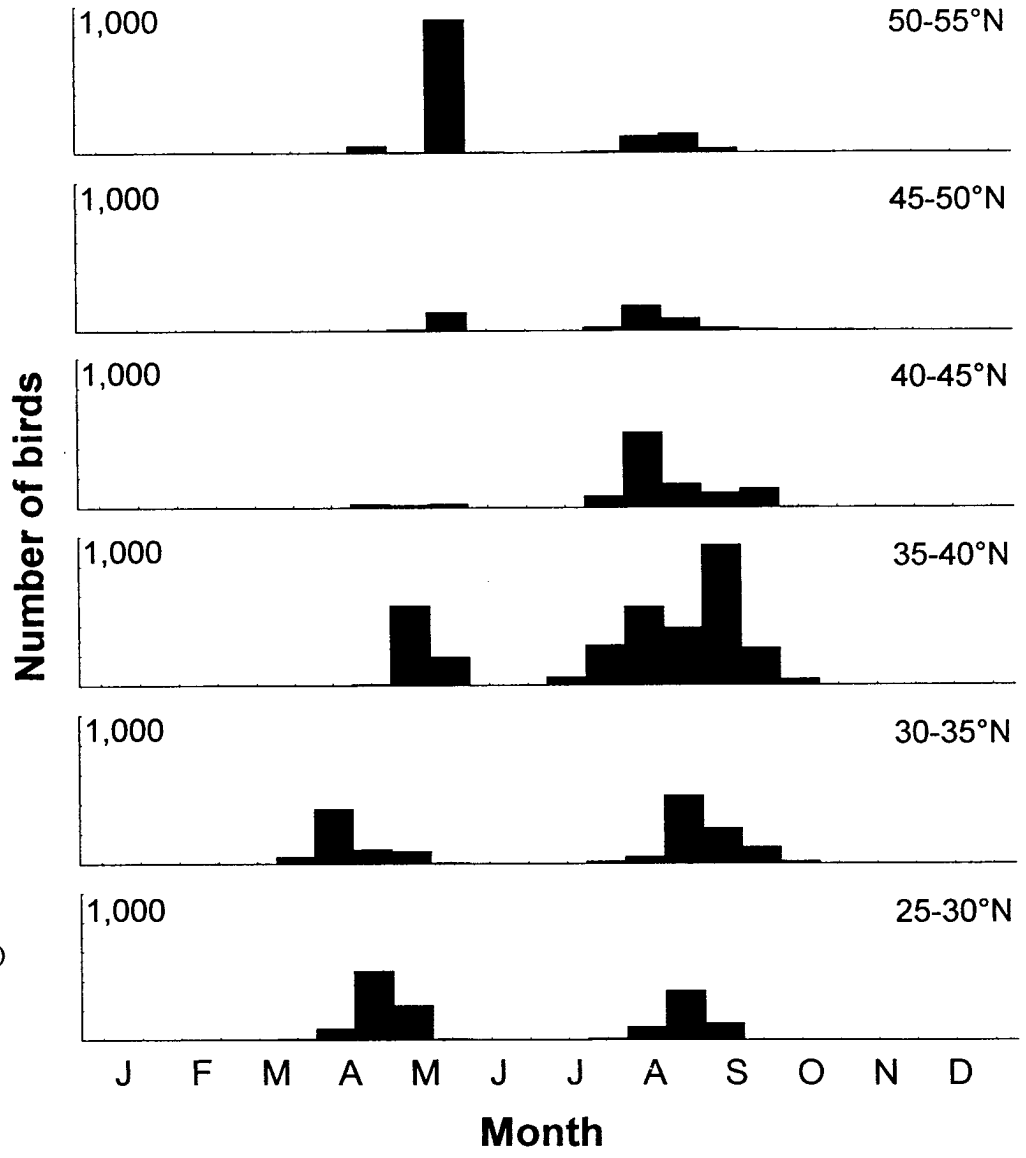
Body Size: Medium
Foraging Guild: Aquatic prober/gleaner
Foraging Habitat: Water depth - wet to 8 cm; vegetative cover - bare to sparse
Migration Distance: Long
Migration Pattern: Narrow Band
Dispersion: Moderately dispersed; 60% of total maximum sightings occur in 5 spring and 3 fall 0.1° lat-long blocks.
Six sites with highest counts: (see Appendix for more information)
Cheyenne Bottoms Wildlife Management Area, Kansas
Minnewaukan Flats, Devil's Lake, North Dakota
Quill Lakes, Saskatchewan
Gillespie Lake area, Alberta
Pelican Lake, Saskatchewan
Laguna Atascosa National Wildlife Refuge, Texas

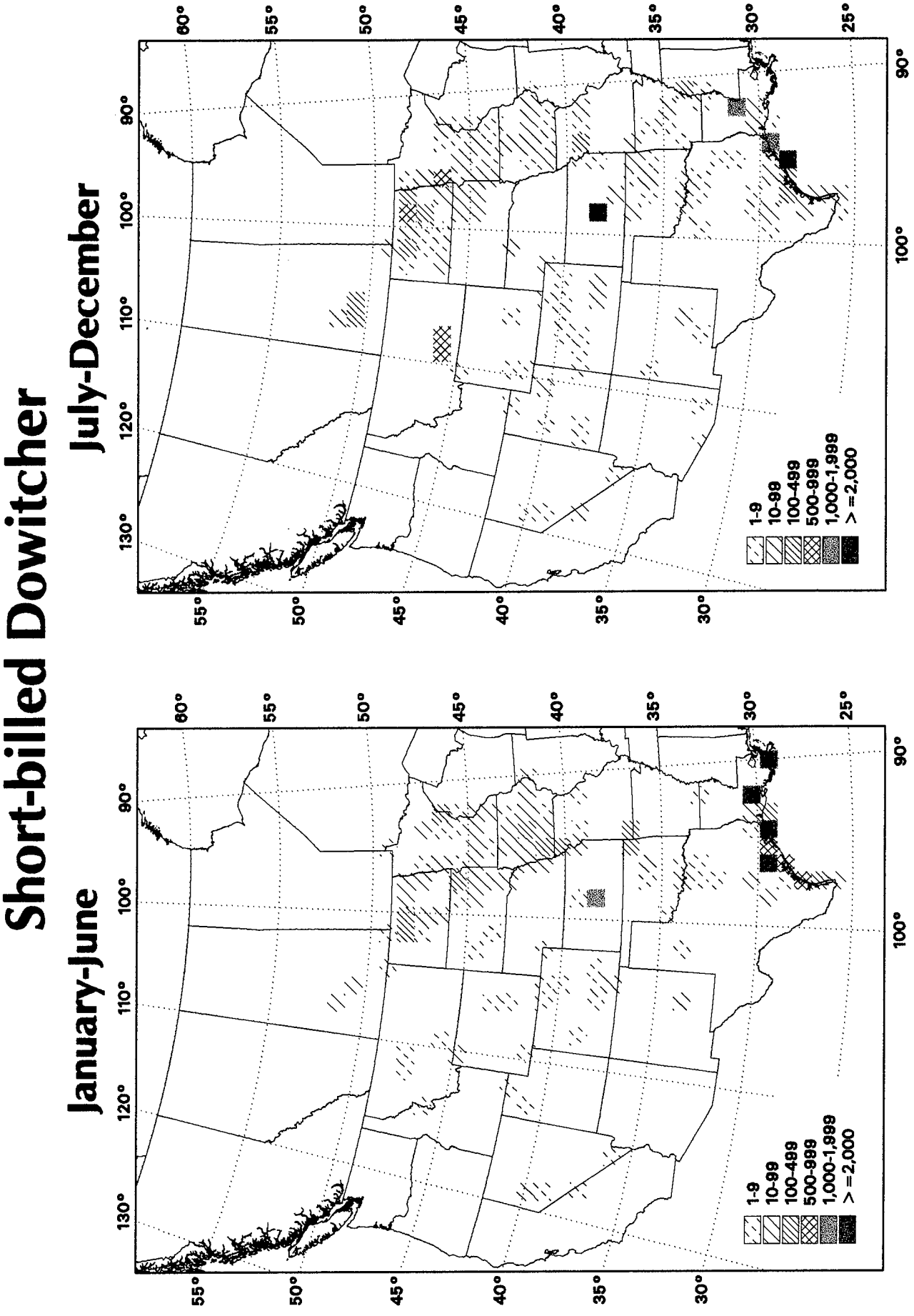



Buff-breasted Sandpiper
January-June
July-December
1-9
10-49
50-99
> =100
130°
120°
110°
100°
90°
80°
60°
55°
50°
45°
40°
35°
30°
25°

Buff-breasted Sandpiper ***(Tryngites subruficollis)***

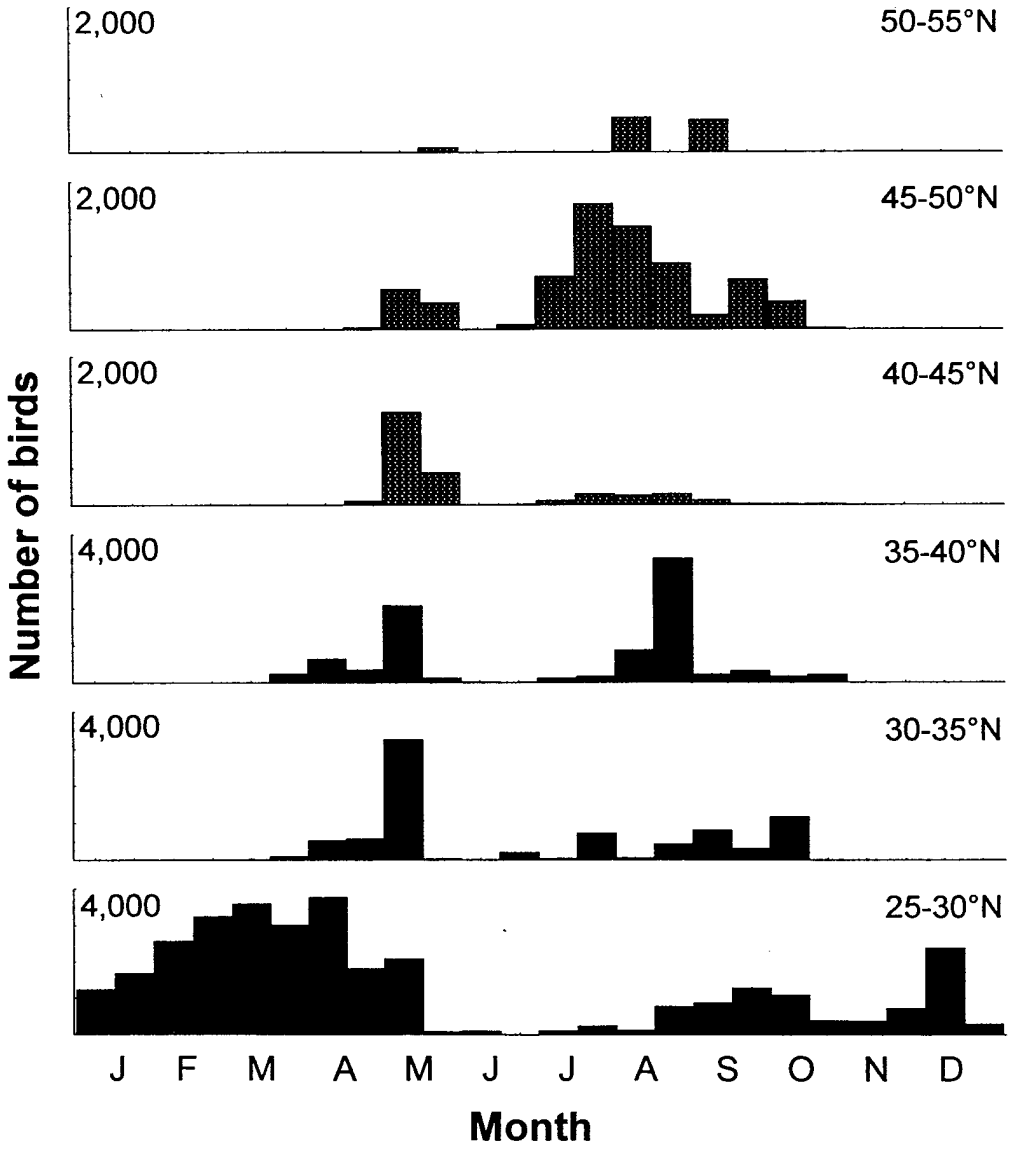
Body Size: Medium
Foraging Guild: Aquatic/terrestrial gleaner
Foraging Habitat: Water depth - dry to 3 cm; vegetative cover - bare to dense
Migration Distance: Long
Migration Pattern: Narrow Band
Dispersion: Moderately to broadly dispersed; 60% of total maximum sightings occur in 6 spring and 14 fall 0.1° lat-long blocks.
Six sites with highest counts: (see Appendix for more information)
Beaverhill Lake, Alberta
Between Duson and Crowley, Louisiana
Wagoner County, Oklahoma
Kleberg County, Texas
Coweta sod farms, Wagoner County, Oklahoma
Riverton Wildlife Area, Fremont County, Iowa

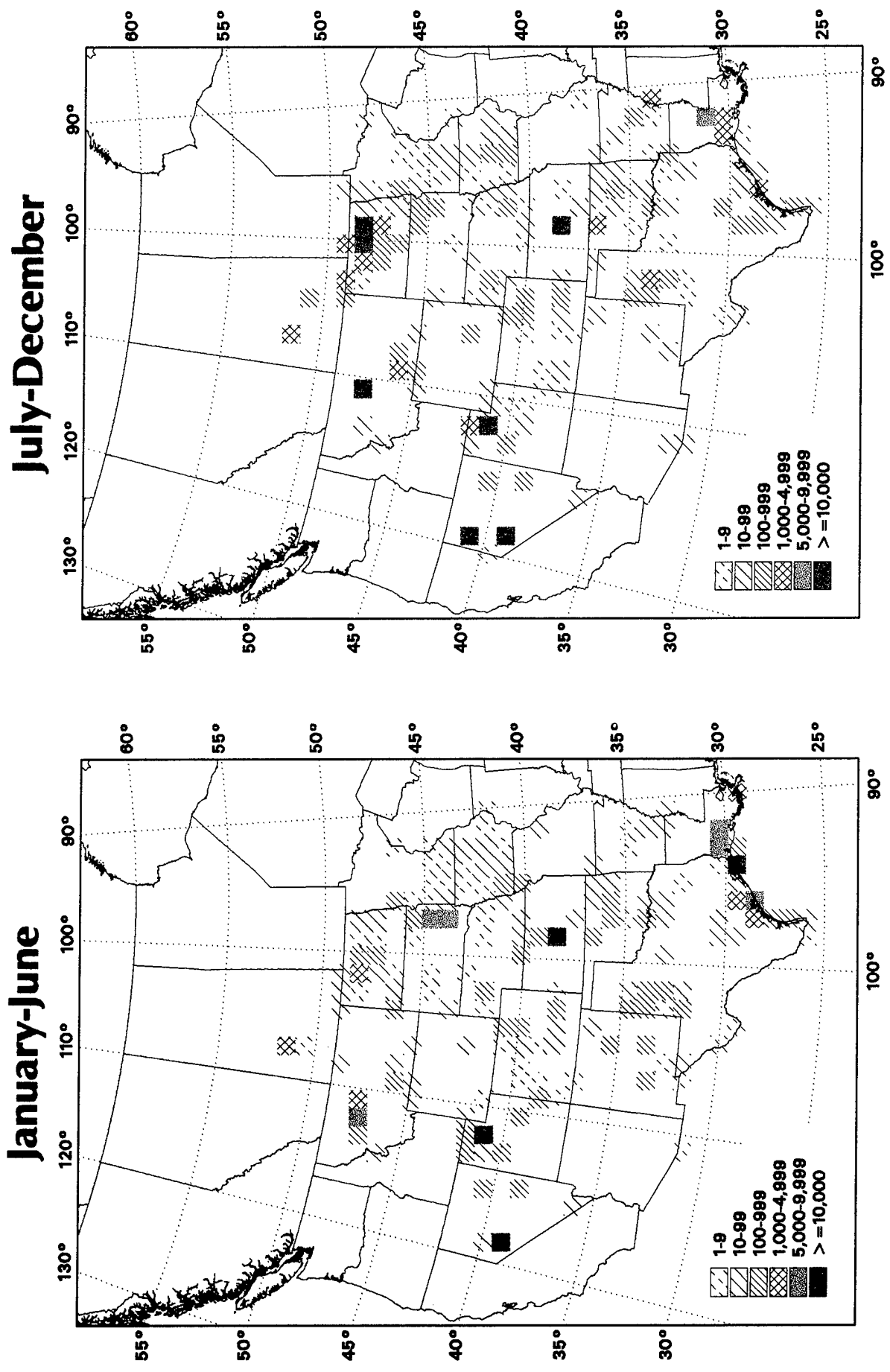



Short-billed Dowitcher
January-June
July-December
1-9
10-99
100-499
500-999
1,000-1,999
> =2,000
60°
55°
50°
45°
40°
35°
30°
25°
130°
120°
110°
100°
90°

Short-billed Dowitcher ***(Limnodromus griseus)***

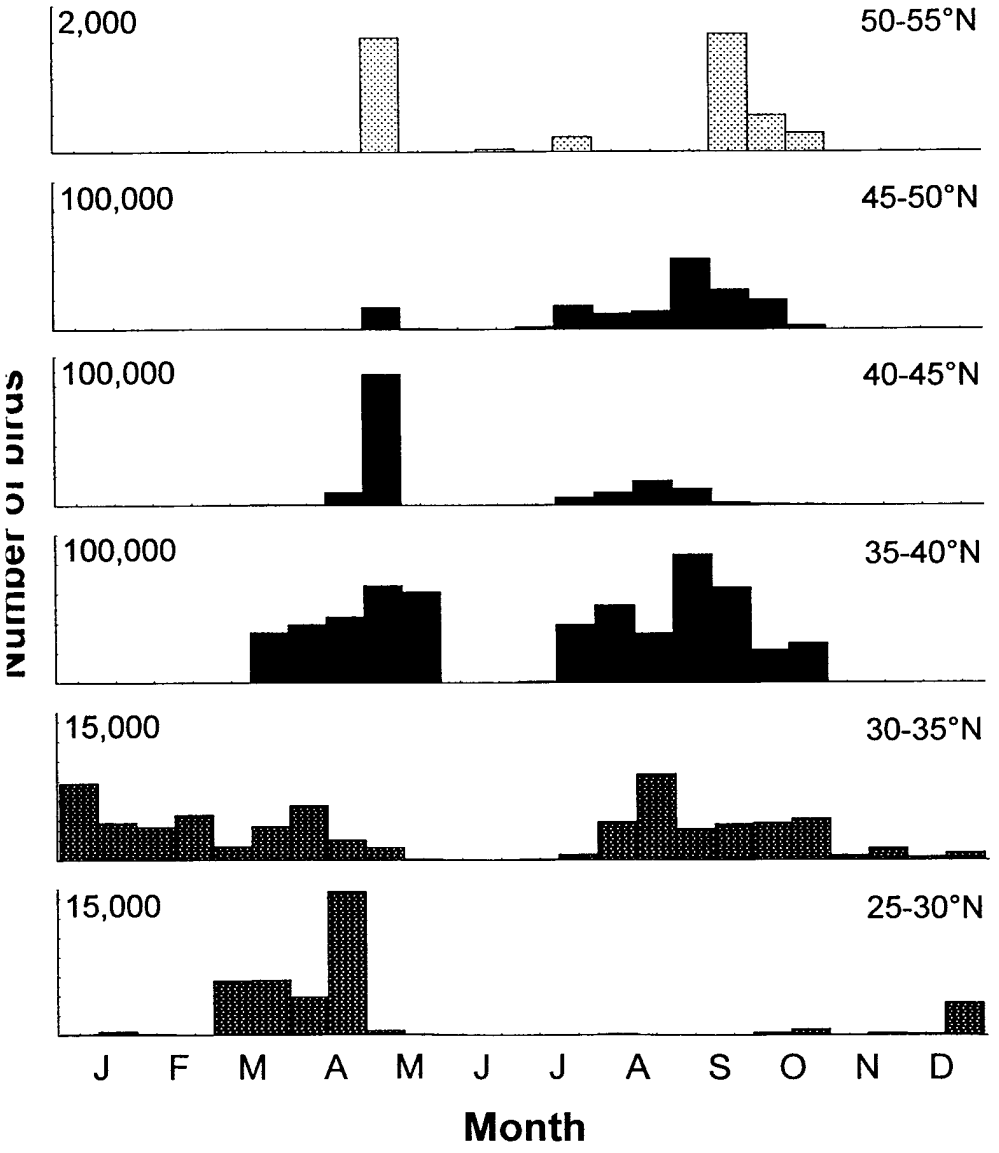
Body Size: Medium
Foraging Guild: Aquatic prober/gleaner
Foraging Habitat: Water depth - wet to 10 cm; vegetative cover - bare to sparse
Migration Distance: Intermediate
Migration Pattern: Narrow band/widespread
Dispersion: Moderately dispersed; 60% of total maximum sightings occur in 5 spring and 6 fall 0.1° lat-long blocks.
Six sites with highest counts: (see Appendix for more information)
Grand Terre, Jefferson Parish, Louisiana
Rice fields in Harris and Waller counties, Texas
Rice fields in Acadia Parish, Louisiana
Cheyenne Bottoms Wildlife Management Area, Kansas
Eagle Lake, Texas
Anahuac National Wildlife Refuge, Texas

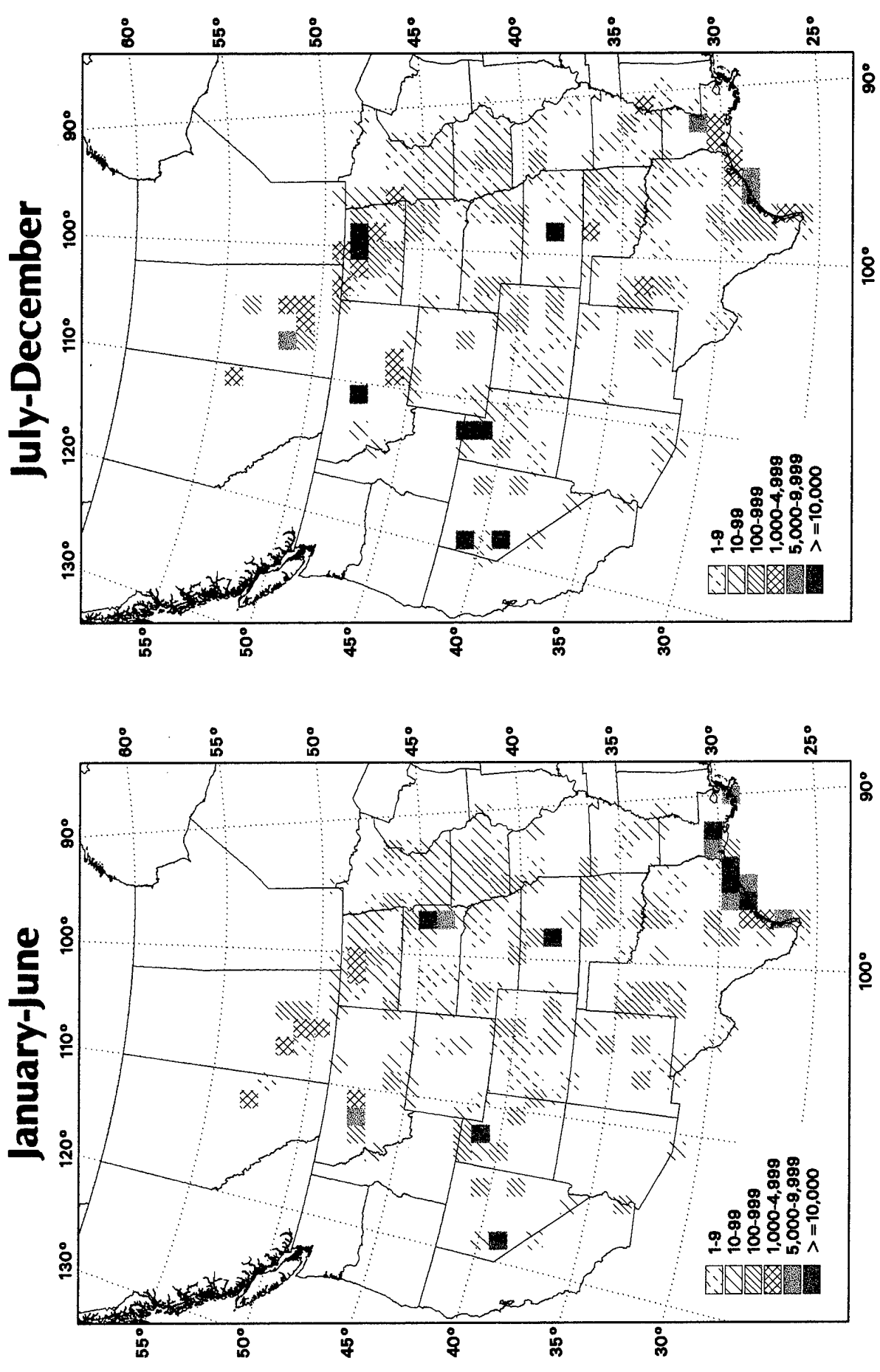


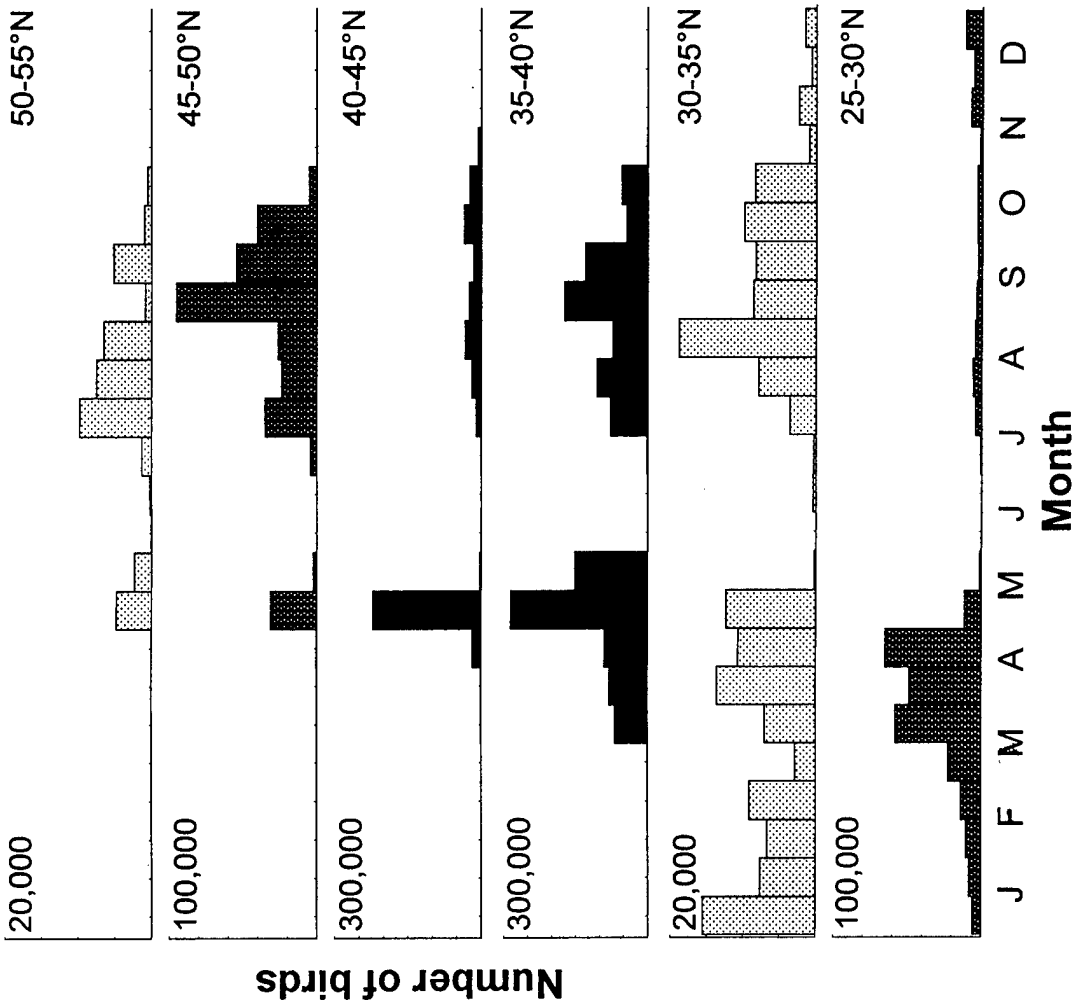

Long-billed Dowitcher
January-June
July-December
1-9
10-99
100-999
1,000-4,999
5,000-9,999
> =10,000
60°
55°
50°
45°
40°
35°
30°
25°
90°
100°
110°
120°
130°

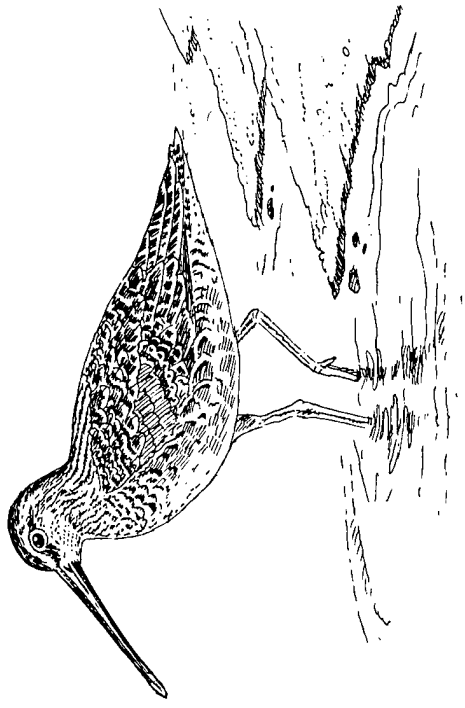
Long-billed Dowitcher *(Limnodromus scolopaceus)*

Body Size: Medium
Foraging Guild: aquatic prober/gleaner
Foraging Habitat: Water depth - wet to 10 cm; vegetative cover - bare to sparse
Migration Distance: Intermediate
Migration Pattern: Widespread
Dispersion: Moderately dispersed; 60% of total maximum sightings occur in 6 spring and 6 fall 0.1° lat-long blocks.
Six sites with highest counts: (see Appendix for more information)
Cheyenne Bottoms Wildlife Management Area, Kansas
Great Salt Lake area, Utah
Lahontan Valley, Nevada, including Carson Lake and Stillwater National Wildlife Refuge
Minnewaukan Flats, Devil's Lake, North Dakota
Sewage ponds, Devil's Lake, North Dakota
Benton Lake National Wildlife Refuge, Montana

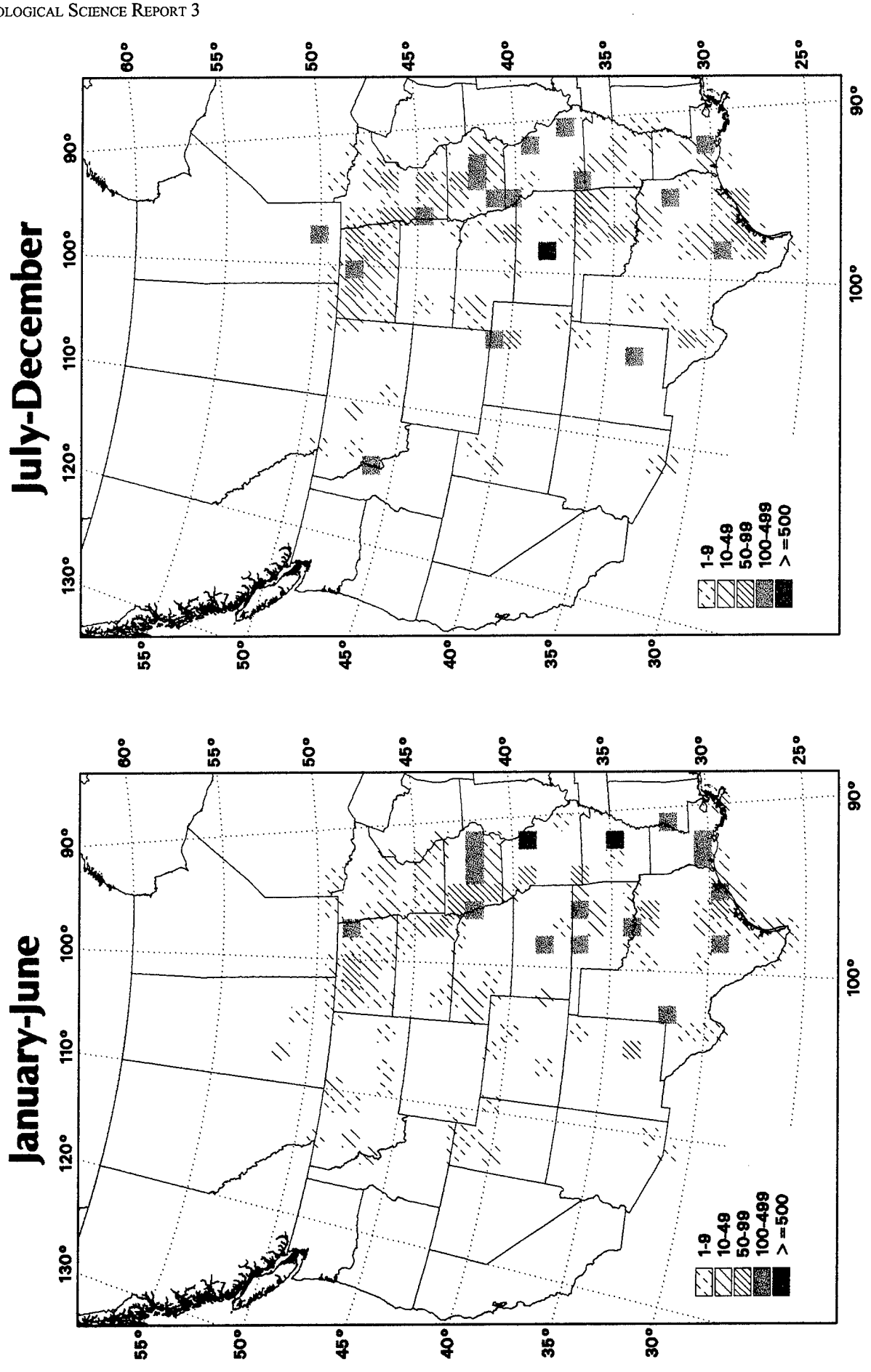



All dowitchers
January-June
July-December
1-9
10-99
100-999
1,000-4,999
5,000-9,999
> =10,000
130°
120°
110°
100°
90°
80°
55°
50°
45°
40°
35°
30°
25°


50-55°N
45-50°N
40-45°N
35-40°N
30-35°N
25-30°N
20,000
100,000
300,000
300,000
20,000
100,000
J F M A M J J A S O N D
Month
Number of birds

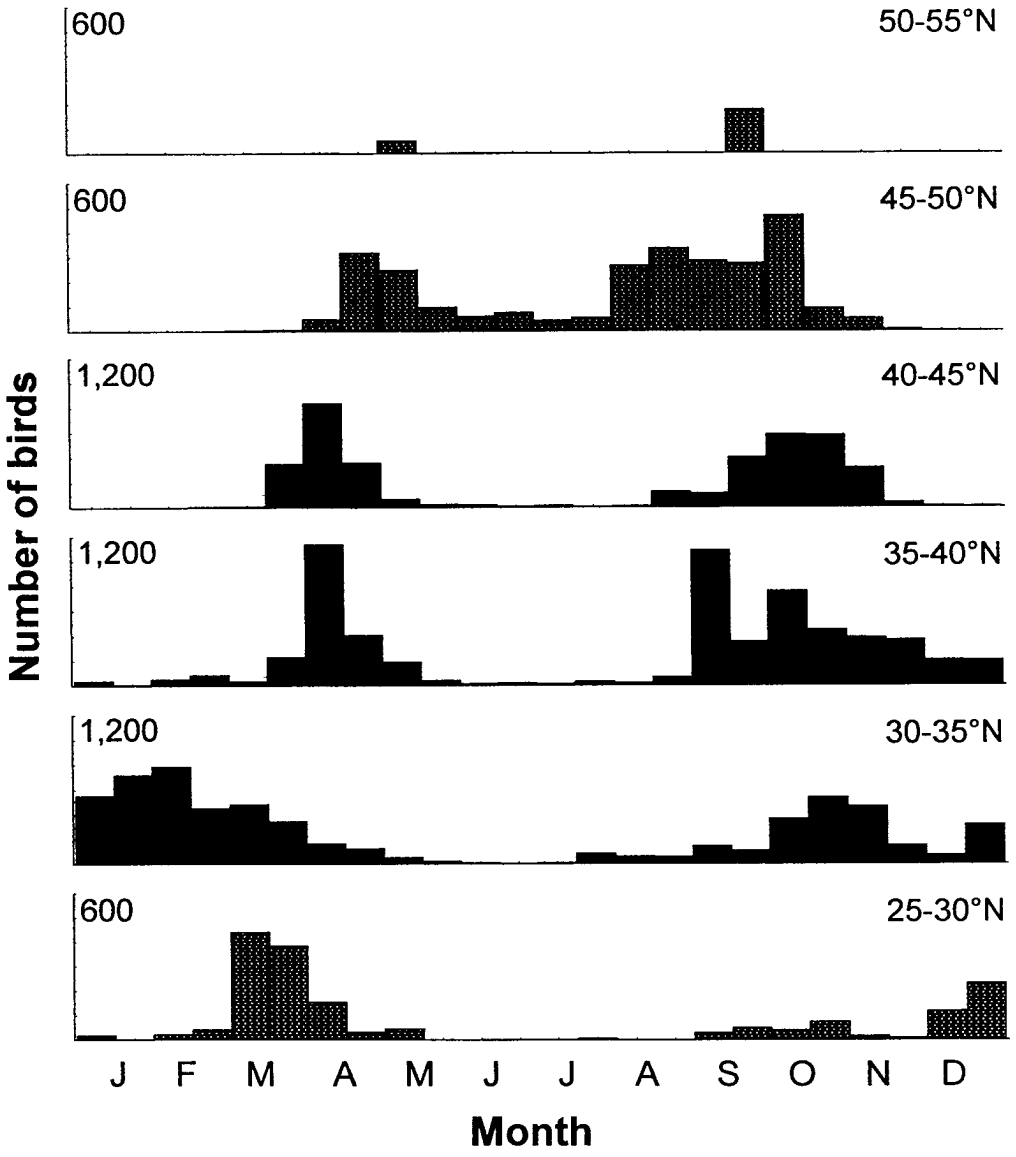


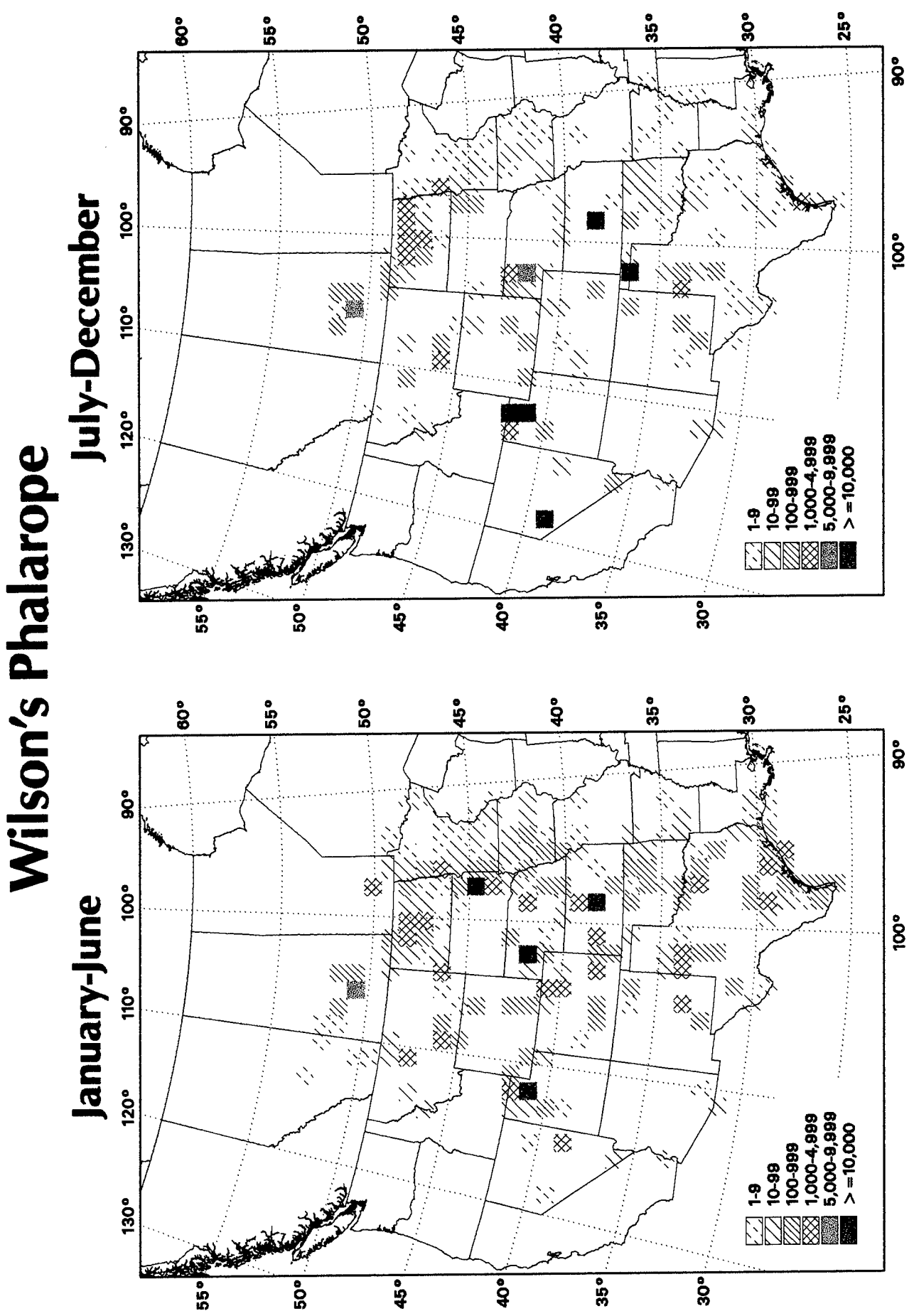
Common Snipe



Common Snipe *(Gallinago gallinago)*

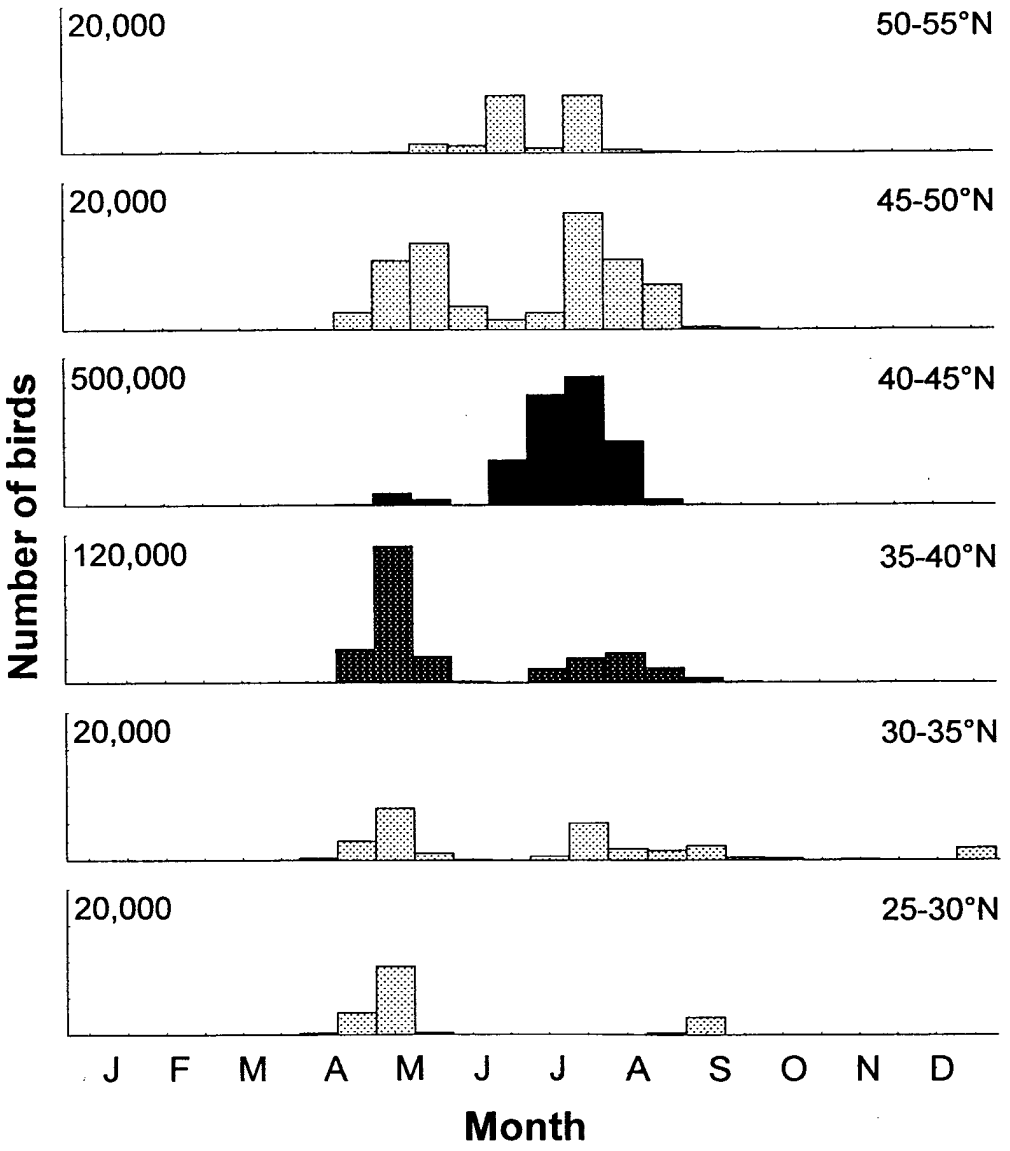
Body Size: Medium
Foraging Guild: Aquatic prober/gleaner
Foraging Habitat: Water depth - dry to 4 cm; vegetative cover - bare to dense
Migration Distance: Short
Migration Pattern: Not assigned
Dispersion: Broadly dispersed; 60% of total maximum sightings occur in 16 spring and 19 fall 0.1° lat-long blocks.
Six sites with highest counts: (see Appendix for more information)
Cheyenne Bottoms Wildlife Management Area, Kansas
Ted Shanks Wildlife Area, Missouri
Between Duson and Crowley, Louisiana
Riverton Wildlife Area, Fremont County, Iowa
Mitchell Lake, Bexar County, Texas
Joe Hogan Fish Hatchery, Arkansas




Wilson's Phalarope
January-June
July-December
60°
55°
50°
45°
40°
35°
30°
25°
90°
100°
110°
120°
130°
1-9
10-99
100-999
1,000-4,999
5,000-9,999
> = 10,000

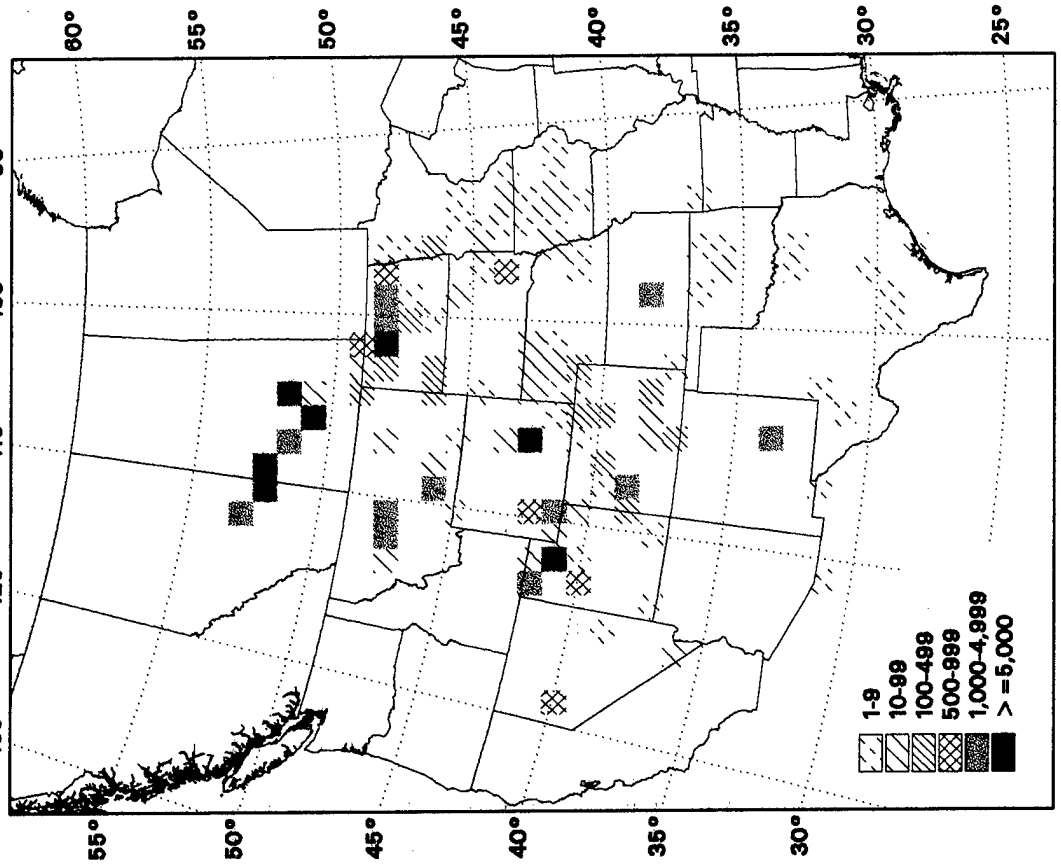
Wilson's Phalarope *(Phalaropus tricolor)*

Body Size: Medium
Foraging Guild: Aquatic/pelagic gleaner
Foraging Habitat: Water depth - wet to deep; vegetative cover - bare to sparse
Migration Distance: Intermediate
Migration Pattern: Widespread
Dispersion: Moderately dispersed; 60% of total maximum sightings occur in 5 spring and 6 fall 0.1° lat-long blocks.
Six sites with highest counts: (see Appendix for more information)
Great Salt Lake area, Utah
Cheyenne Bottoms Wildlife Management Area, Kansas
Stillwater National Wildlife Refuge, Nevada
Between Cactus Lake and Etter, Moore County, Texas
Crescent Lake National Wildlife Refuge, Nebraska
Chaplin Lakes, Saskatchewan

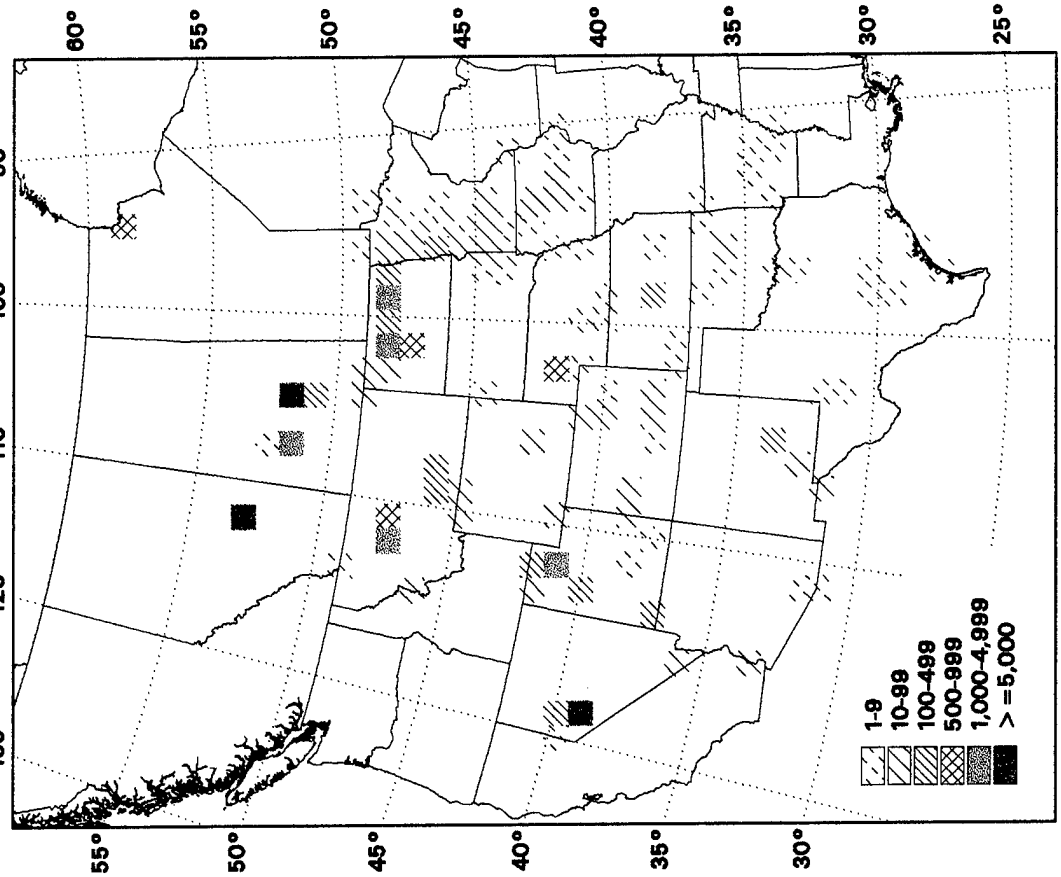


Red-necked Phalarope

January-June

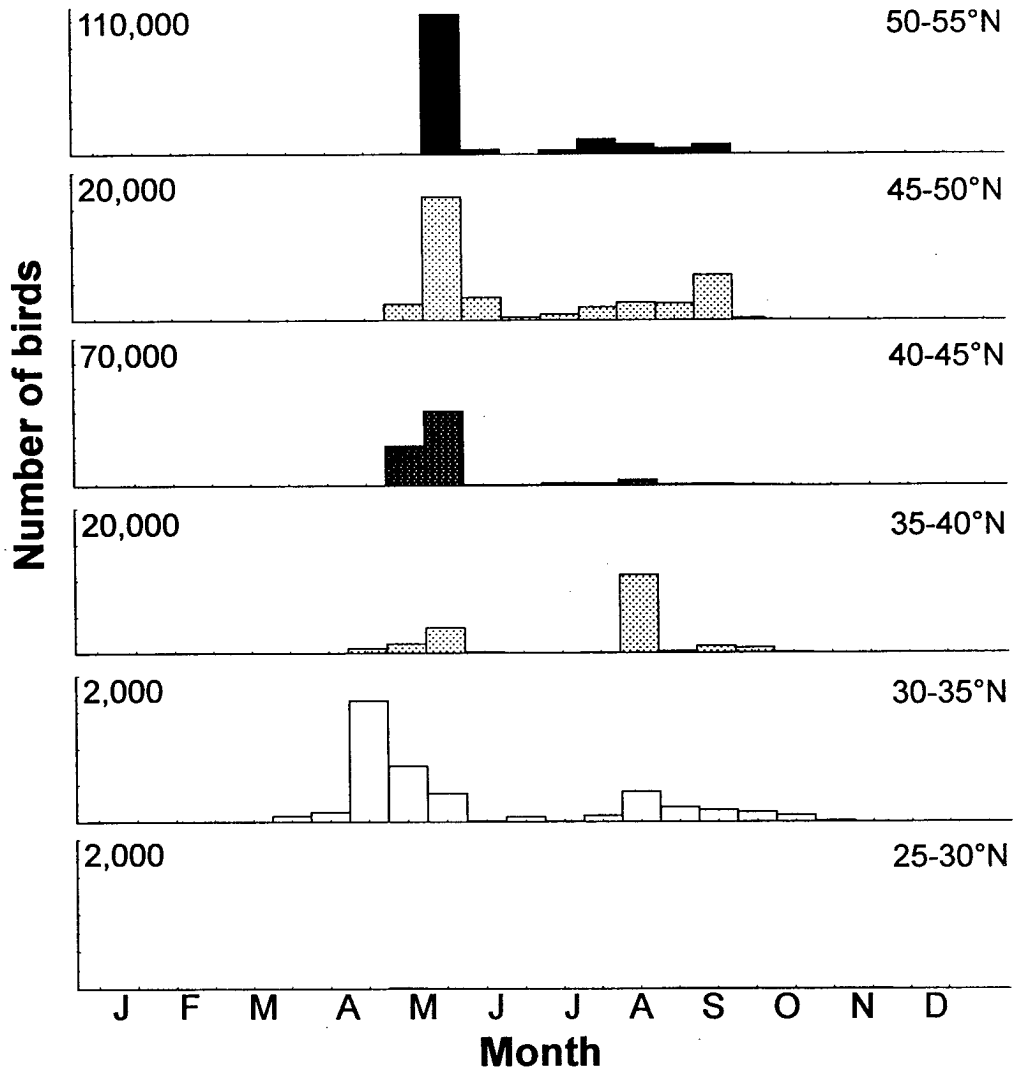


July-December



Red-necked Phalarope *(Phalaropus lobatus)*

Body Size: Medium
Foraging Guild: Aquatic/pelagic gleaner
Foraging Habitat: Water depth - wet to deep; vegetative cover - bare to sparse
Migration Distance: Intermediate
Migration Pattern: Widespread
Dispersion: Moderately dispersed; 60% of total maximum sightings occur in 4 spring and 4 fall 0.1° lat-long blocks.
Six sites with highest counts: (see Appendix for more information)
Quill Lakes, Saskatchewan
Great Salt Lake area, Utah
Manito Lake and Wells Lake, Saskatchewan
Kellarney Lake and Leane Lake, Alberta
Landis Lake, Saskatchewan
Carson Lake, Nevada



Acknowledgments

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Cited References

Butler, R. F., H. Delgado, H. de la Cueva, V. Pulido, and B. K. Sandercock. 1996. Migration routes of the western sandpiper. Wilson Bulletin 108:622–672.

Colwell, M. A., and J. R. Jehl, Jr. 1994. Wilson's phalarope (*Phalaropus tricolor*). *In* A. Poole and F. Gill, editors. The Birds of North America, No. 83. Philadelphia: The Academy of Natural Sciences. The American Ornithologists' Union. Washington, D.C.

Colwell, M. A., S. D. Fellows, and L. W. Oring. 1988. Chronology of shorebird migration at Last Mountain Lake National Wildlife Area, Saskatchewan, Canada. Wader Study Group Bulletin 52:18–22.

Cooper, J. M. 1994. Least sandpiper (*Calidris minutilla*). *In* A. Poole and F. Gill, editors. The Birds of North America, No. 115. Philadelphia: The Academy of Natural Sciences. The American Ornithologists' Union. Washington, D.C.

Davis, C. A. 1998. Ecology and management of migrant shorebirds in the Playa Lakes Region of Texas. Wildlife Monographs 140:1–45.

Dickson, H. L., and A. R. Smith. 1988. Canadian prairie shorebird program: An update. Wader Study Group Bulletin 52:23–27.

Elphick, C. S., and T. L. Tibbitts. 1998. Greater yellowlegs (*Tringa melanoleuca*). *In* A. Poole and F. Gill, editors. The Birds of North America, No. 355. Philadelphia: The Academy of Natural Sciences. The American Ornithologists' Union. Washington, D.C.

Farmer, A. H., and J. H. Wiens. 1999. Models and reality: Time-energy trade-offs in pectoral sandpiper (*Calidris melanotos*) migration. Ecology 80:2566-2580.

Gratto-Trevor, C. L. 1992. Semipalmated sandpiper. *In* A. Poole, P. Stettenheim, and F. Gill, editors. The Birds of North America, No. 6. Philadelphia: The Academy of Natural Sciences. The American Ornithologists' Union. Washington, D.C.

Griggs, J. L. 1997. American Bird Conservancy's field guide to all the birds of North America. Harper Collins Publishers, Inc. New York. 177 pp.

Haig, S. M. 1992. Piping plover. *In* A. Poole, P. Stettenheim, and F. Gill, editors. The Birds of North America, No. 2. Philadelphia: The Academy of Natural Sciences. The American Ornithologists' Union. Washington, D.C.

Harrington, B. A., F. J. Leewenberg, S. L. Resende, R. McNeil, B. T. Thomas, J. S. Grear, and E. F. Martinez. 1991. Migration and mass change of white-rumped sandpipers in North and South America. Wilson Bulletin 103:621–636.

Hayman, P., J. Marchant, and T. Prater. 1986. Shorebirds: An identification guide to the waders of the world. Houghton Mifflin Company, Boston, Mass. 412 pp.

Helmers, D. L. 1992. Shorebird Management Manual. Western Hemisphere Shorebird Reserve Network, Manomet, Mass.

Holmes, R. T., and F. A. Pitelka. 1998. Pectoral sandpiper (*Calidris melanotos*). *In* A. Poole and F. Gill, editors. The Birds of North America, No. 348. Philadelphia: The Academy of Natural Sciences. The American Ornithologists' Union. Washington, D.C.

Howe, M. A., P. H. Geissler, and B. A. Harrington. 1989. Population trends of North American shorebirds based on the International Shorebird Survey. Biological Conservation 49:185–199.

Howell, S. N. G., and S. Webb. 1995. A guide to the birds of Mexico and northern Central America. Oxford University Press Inc., New York. 851 pp.

Iverson, G. C., S. E. Warnock, R. W. Butler, M. A. Bishop, and N. Warnock. 1996. Spring migration of western sandpipers along the Pacific Coast of North America: A telemetry study. Condor 98:10–21.

Johnson, O. W., and P. G. Connors. 1996. American golden-plover (*Pluvialis dominica*) and Pacific golden-plover (*Pluvialis fulva*). *In* A. Poole and F. Gill, editors. The Birds of North America, Nos. 201–202. Philadelphia: The Academy of Natural Sciences. The American Ornithologists' Union. Washington, D.C.

Klima, J., and J. R. Jehl, Jr. 1998. Stilt sandpiper (*Calidris himantopus*). *In* A. Poole and F. Gill, editors. The Birds of North America, No. 341. Philadelphia: The Academy of Natural Sciences. The American Ornithologists' Union. Washington, D.C.

Knopf, F. L. 1994. Avian assemblages on altered grasslands. Studies in Avian Biology 15:247–257.

Knopf, F. L. 1996. Mountain plover (*Charadrius montanus*). *In* A. Poole and F. Gill, editors. The Birds of North America, No. 211. Philadelphia: The Academy of Natural Sciences. The American Ornithologists' Union. Washington, D.C.

Lanctot, R. B., and C. D. Laredo. 1994. Buff-breasted sandpiper (*Tryngites subruficollis*). *In* A. Poole and F. Gill, editors. The Birds of North America, No. 91. Philadelphia: The Academy of Natural Sciences. The American Ornithologists' Union. Washington, D.C.

Laubhan, M. K., and L. H. Fredrickson. 1993. Integrated wetland management: Concepts and opportunities. Transactions of the North American Wildlife and Natural Resources Conference 58:323–334.

Laubhan, M. K., and L. H. Fredrickson. 1997. Wetlands of the Great Plains: Habitat characteristics and vertebrate aggregations. Ecological Studies 125:20–48.

Morrison, R. I. G., and R. K. Ross. 1989. Atlas of Nearctic shorebirds on the coast of South America. Vol. 1. Canadian Wildlife Service Special Publication, Ottawa.

Morrison, R. I. G., C. Downes, and B. Collins. 1994. Population trends of shorebirds in fall migration in eastern Canada 1974–1991. Wilson Bulletin 106:431–447.

Morrison, R. I. G., R. W. Butler, G. W. Beyersbergen, H.. L. Dickson, A. Bourget, P. W. Hicklin, J. P. Goossen, R. K. Ross, and C. L. Trevor-Gratto. 1995. Potential Western Hemisphere Shorebird Reserve Network sites for shorebirds in Canada: Second edition. Canadian Wildlife Service Technical Report Series No. 227.

Moskoff, W. 1995. Solitary sandpiper (*Tringa solitaria*). *In* A. Poole and F. Gill, editors. The Birds of North America, No. 156. Philadelphia: The Academy of Natural Sciences. The American Ornithologists' Union. Washington, D.C.

Myers, J. P., M. Sallaberry, E. Ortiz, G. Castro, L. M. Gordon, J. L. Maron, C. T. Schick, E. Tabilo, P. Z. Antas, and T. Below. 1990. Migration routes of New World sanderlings (*Calidris alba*). Auk 107:172–180.

National Geographic Society. 1987. Field guide to the birds of North America. National Geographic Society, Washington, D.C. 464 pp.

Oring, L. W., and W. M. Davis. 1966. Shorebird migration at Norman, Oklahoma: 1961–63. Wilson Bulletin 78:166–174.

Oring, L. W., E. M. Gray, and J. M. Reed. 1997. Spotted sandpiper (*Actitis macularia*). *In* A. Poole and F. Gill, editors. The Birds of North America, No. 289. Philadelphia: The Academy of Natural Sciences. The American Ornithologists' Union. Washington, D.C.

Page, G. W., J. S. Warriner, J. C. Warriner, and P. W. C. Paton. 1995. Snowy plover (*Charadrius alexandrinus*). *In* A. Poole and F. Gill, editors. The Birds of North America, No. 154. Philadelphia: The Academy of Natural Sciences. The American Ornithologists Union. Washington, D.C.

Parmelee, D. F. 1992. White-rumped sandpiper. *In* A. Poole, P. Stettenheim, and F. Gill, editors. The Birds of North America, No. 29. Philadelphia: The Academy of Natural Sciences. The American Ornithologists' Union. Washington, D.C.

Paulson, D. R. 1995. Black-bellied plover (*Pluvialis squatarola*). *In* A. Poole and F. Gill, editors. The Birds of North America, No. 186. Philadelphia: The Academy of Natural Sciences. The American Ornithologists' Union. Washington, D.C.

Piersma, T. 1987. Hop, skip, or jump? Constraints on migration of arctic waders by feeding, fattening, and flight speed. Limosa 60:185–194.

Rettig, V. E., and S. R. Aycock. 1994. Evaluation of shorebird use of selected refuge habitats in the lower Mississippi Valley. U.S. Fish and Wildlife Service, Jackson, Miss.

Robinson, J. A., L. W. Oring, J. P. Skorupa, and R. Boettcher. 1997. American avocet (*Recurvirostra americana*). *In* A. Poole and F. Gill, editors. The Birds of North America, No. 275. Philadelphia: The Academy of Natural Sciences. The American Ornithologists' Union. Washington, D.C.

Roy, J. F. 1996. Birds of the elbow. No. 3, Manley Callin Series. Special Publication No. 21. Saskatchewan Natural History Society, Regina.

SAS Institute Inc. 1990. SAS Language, Version 6, First edition. Cary, NC: SAS Institute Inc. 1042 pp.

Skagen, S. K. 1997. Stopover ecology of transitory populations: The case of migrant shorebirds. Ecological Studies 125:244–269.

Skagen, S. K., and F. L. Knopf. 1993. Toward conservation of midcontinental shorebird migrations. Conservation Biology 7:533–541.

Skagen, S. K., and F. L. Knopf. 1994a. Migrating shorebirds and habitat dynamics at a prairie wetland complex. Wilson Bulletin 106:91–105.

Skagen, S. K., and F. L. Knopf. 1994b. Residency patterns of migrating sandpipers at a midcontinental stopover. Condor 96:944–956.

Skeel, M. A., and E. P. Mallory. 1996. Whimbrel (*Numenius phaeopus*). *In* A. Poole and F. Gill, editors. The Birds of North America, No. 219. Philadelphia: The Academy of Natural Sciences. The American Ornithologists' Union. Washington, D.C.

Warnock, N., and M. A. Bishop. 1998. Spring stopover ecology of migrant western sandpipers. Condor 100:456–467.

Warnock, N. D., and R. E. Gill. 1996. Dunlin (*Calidris alpina*). *In* A. Poole and F. Gill, editors. The Birds of North America, No. 203. Philadelphia: The Academy of Natural Sciences. The American Ornithologists' Union. Washington, D.C.

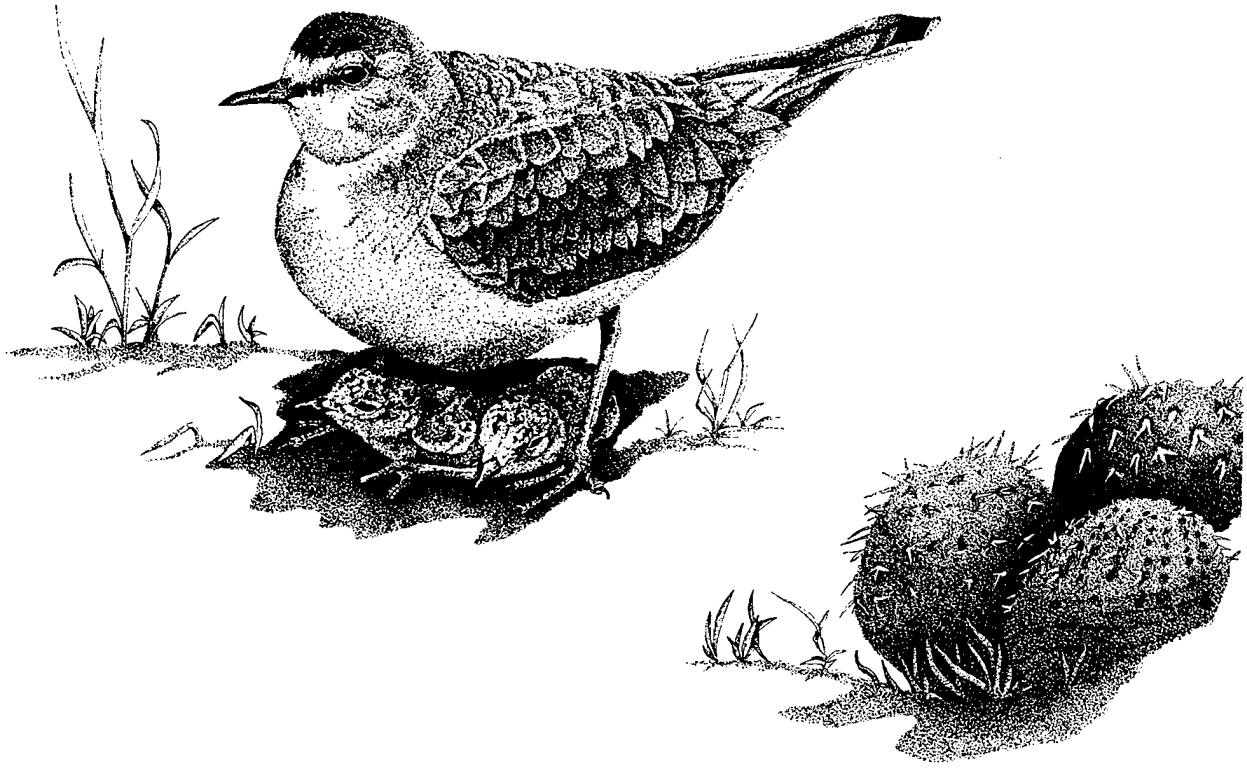
Warnock, N., S. M. Haig, and L. W. Oring. 1998. Monitoring species richness and abundance of shorebirds in the western Great Basin. Condor 100:589–600.

Wilson, W. H. 1994. Western sandpiper (*Calidris mauri*). *In* A. Poole and F. Gill, editors. The Birds of North America, No. 90. Philadelphia: The Academy of Natural Sciences. The American Ornithologists' Union. Washington, D.C.

APPENDIX

This appendix lists the maximum counts recorded for each species and species group in 0.1° x 0.1° lat-long cells in descending order of abundance. The maximum counts represent the sum of all sites within the 0.1° x 0.1° lat-long cells. The locations listed are the major sites within the identified lat-long cells. The values for latitude and longitude represent the center of the cell. Species summaries are presented in taxonomic order.

Large numbers of shorebirds are notoriously difficult to survey and several shorebird experts suspected that some counts were overestimates. Therefore, we truncated counts of individual species at a single site (with no subsites reported) that exceeded a reasonable estimate of 50,000, 60,000, or 100,000, depending on the species and expert opinion. We then made the appropriate adjustments for all corresponding species groups. Counts of six species (semipalmated sandpiper, least sandpiper, white-rumped sandpiper, Baird's sandpiper, long-billed dowitcher, and Wilson's phalarope) were treated in this manner.



Appendix.

All Shorebirds

January through June (Maximum count totals = 3,460,485)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
>500,000	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
415,735	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
167,230	41.10	112.00	Layton Marsh, Great Salt Lake, Utah
147,750	51.90	104.10	Quill Lakes, Saskatchewan
136,455	41.10	112.10	Howard Slough Wildlife Management Area, Great Salt Lake, Utah
102,487	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
98,619	41.50	112.20	Bear River National Wildlife Refuge, Great Salt Lake, Utah
82,789	48.10	99.20	Minnewaukan Flats, Devil's Lake, North Dakota
80,338	50.40	106.60	Chaplin Lakes, Saskatchewan
59,773	50.10	106.00	Old Wives Lake, Saskatchewan
53,832	29.50	94.60	Bolivar Flats, Texas
48,112	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
47,266	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
45,692	40.90	112.10	Farmington Bay, Great Salt Lake, Utah
45,514	28.90	95.60	San Bernard National Wildlife Refuge, Texas
43,249	30.20	92.30	Between Duson and Crowley, Louisiana
36,897	53.30	112.50	Beaverhill Lake, Alberta
36,417	52.70	109.70	Manito Lake and Wells Lake, Saskatchewan
35,449	44.70	97.00	Dry Lake B, Clark County, South Dakota
34,389	29.30	89.90	Grand Terre, Jefferson Parish, Louisiana
32,092	39.30	118.70	Carson Lake, Nevada
31,648	52.10	110.50	Sounding Lakes, Alberta
26,877	41.20	112.30	Ogden area, Great Salt Lake, Utah
25,559	28.20	96.60	Matagorda National Wildlife Refuge, Texas
23,238	52.70	110.00	Reflex Lakes, Alberta
23,187	29.90	95.90	Rice fields, Harris County and Waller County, Texas
23,068	49.30	100.30	Whitewater Lake, Manitoba
21,867	38.20	98.60	Quivira National Wildlife Refuge, Kansas
21,542	51.10	105.20	Last Mountain Lake, Saskatchewan

Appendix. *Continued.*

All Shorebirds (Concluded)

July through December (Maximum count totals = 2,852,086)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
588,924	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
>370,000	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
273,704	41.50	112.20	Bear River National Wildlife Refuge, Great Salt Lake, Utah
250,013	41.00	112.20	Antelope Island, Great Salt Lake, Utah
232,943	41.10	112.00	Layton Marsh, Great Salt Lake, Utah
153,013	41.10	112.10	Howard Slough Wildlife Management Area, Great Salt Lake, Utah
88,002	51.90	104.10	Quill Lakes, Saskatchewan
83,035	40.90	112.10	Farmington Bay, Great Salt Lake, Utah
78,332	39.40	119.10	Lahontan Valley, Nevada
75,415	39.30	118.70	Carson Lake, Nevada
74,013	41.00	112.10	North Farmington Bay, Great Salt Lake, Utah
63,889	48.10	99.20	Minnewaukan Flats, Benson County, North Dakota
54,003	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
39,602	51.10	107.10	19 km west of Luck Lake, Saskatchewan
38,312	41.30	112.20	Harold Crane Wildlife Management Area, Great Salt Lake, Utah
32,801	39.50	118.60	Stillwater National Wildlife Refuge, Nevada
32,005	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
31,840	41.20	112.00	Riverdale, Great Salt Lake, Utah
25,402	31.50	92.30	Catahoula Lake, Louisiana
23,800	48.00	98.90	Devil's Lake, North Dakota
23,474	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
22,146	46.90	96.80	North Dakota State University, Fargo, North Dakota
20,670	40.50	118.50	Humboldt Wildlife Management Area, Nevada
20,261	30.20	92.30	Between Duson and Crowley, Louisiana
19,424	41.00	111.90	West of Interpretive Center, Great Salt Lake, Utah
17,748	47.70	111.30	Benton Lake National Wildlife Refuge, Montana
17,650	28.90	95.60	San Bernard National Wildlife Refuge, Texas
17,473	41.20	112.30	Ogden area, Great Salt Lake, Utah
14,960	43.30	94.10	Union Slough National Wildlife Refuge, Iowa
13,246	29.50	94.60	Bolivar Flats, Texas
12,559	38.20	98.60	Quivira National Wildlife Refuge, Kansas

Appendix. *Continued.*

Long Distance Migrants

January through June (Maximum count totals = 741,834)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
>200,000	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
41,568	48.05	99.20	Minnewaukan Flats, Devil's Lake, North Dakota
36,681	51.90	104.10	Quill Lakes, Saskatchewan
17,959	50.40	106.60	Chaplin Lakes, Saskatchewan
17,300	44.70	97.00	Dry Lake B, Clark County, South Dakota
11,755	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
10,000	52.40	110.60	Metiskow Lake, Alberta
10,000	52.40	110.20	Gillespie Lake area, Alberta
9,170	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
7,568	38.20	98.60	Quivira National Wildlife Refuge, Kansas
6,974	48.20	101.20	Sewage lagoons, Minot, North Dakota
6,957	44.00	97.10	Lake County, South Dakota
6,790	44.70	97.60	Dry Lake A, Clark County, South Dakota
6,592	44.00	96.90	Milwaukee Lake, South Dakota
5,626	47.70	100.20	Sheyenne Lake, North Dakota
5,505	47.50	100.80	Blue Lake, North Dakota
5,110	30.20	92.30	Between Duson and Crowley, Louisiana
5,082	50.50	106.00	Pelican Lake, Saskatchewan
4,951	53.30	112.50	Beaverhill Lake, Alberta
4,533	44.30	97.40	Lake Thompson, South Dakota
4,501	46.80	100.40	McKenzie Slough, North Dakota
4,177	40.70	95.60	Riverton Wildlife Area, Fremont County, Iowa
4,024	51.10	107.10	Luck Lake, Saskatchewan

July through December (Maximum count totals = 296,895)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
90,330	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
35,565	51.90	104.10	Quill Lakes, Saskatchewan
22,514	48.10	99.20	Minnewaukan Flats, Benson County, North Dakota
11,118	46.90	96.80	North Dakota State University, Fargo, North Dakota
8,185	51.10	107.10	19 km west of Luck Lake, Saskatchewan
5,747	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
5,596	43.30	94.10	Union Slough National Wildlife Refuge, Iowa
5,283	41.20	101.70	Lake McConaughy, Nebraska
4,872	31.50	92.30	Catahoula Lake, Louisiana
3,216	48.00	98.90	Devil's Lake, North Dakota
3,132	41.80	91.50	Coralville Reservoir, Johnson County, Iowa
3,000	47.10	99.80	Swan Wildlife Refuge, Marion County, Iowa
3,000	58.70	94.10	Churchill, Manitoba
2,752	48.30	99.20	Border of Benson County and Ramsey County, North Dakota
2,745	48.00	97.10	North of Grand Forks Lagoons, North Dakota
2,519	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
2,457	46.90	97.20	Casselton, North Dakota
2,301	48.00	99.50	Benson County, North Dakota
2,154	30.20	92.30	Between Duson and Crowley, Louisiana
2,073	41.70	93.60	Moeckley Prairie, Polk County, Iowa
2,067	41.50	93.40	South of Runnells, Polk County, Iowa
2,066	50.20	97.10	Oak Hammock Marsh, Manitoba

Appendix. *Continued.*

Intermediate Distance Migrants

January through June (Maximum count totals = 2,010,185)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
>300,000	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
274,152	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
132,742	41.10	112.10	Howard Slough Wildlife Management Area, Great Salt Lake, Utah
108,161	41.10	112.00	Layton Marsh, Great Salt Lake, Utah
102,876	51.90	104.10	Quill Lakes, Saskatchewan
70,532	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
40,924	48.10	99.20	Minnewaukan Flats, Devil's Lake, North Dakota
38,479	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
35,244	29.50	94.60	Bolivar Flats, Texas
34,247	52.70	109.70	Manito Lake and Wells Lake, Saskatchewan
33,929	50.40	106.60	Chaplin Lakes, Saskatchewan
31,740	29.30	89.90	Grand Terre, Jefferson Parish, Louisiana
30,414	30.20	92.30	Between Duson and Crowley, Louisiana
29,892	28.90	95.60	San Bernard National Wildlife Refuge, Texas
27,085	39.30	118.70	Carson Lake, Nevada
25,150	41.20	112.30	Ogden area, Great Salt Lake, Utah
24,555	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
20,015	52.70	110.00	Reflex Lakes, Alberta
20,000	52.60	110.10	Kellarney Lake and Leane Lake, Alberta,
19,025	29.90	95.90	Rice fields, Harris County and Waller County, Texas
18,557	29.60	94.60	Anahuac National Wildlife Refuge, Texas
17,042	41.20	112.00	South shore, Great Salt Lake, Utah
16,143	28.20	96.60	Matagorda National Wildlife Refuge, Texas
16,064	51.10	105.20	Last Mountain Lake, Saskatchewan
15,171	40.90	112.10	Farmington Bay, Great Salt Lake, Utah
14,876	26.20	97.20	South Padre Island, Texas

July through December (Maximum count totals = 1,923,495)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
379,064	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
>250,000	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
250,000	41.00	112.20	Antelope Island, Great Salt Lake, Utah
204,951	41.10	112.00	Layton Marsh, Great Salt Lake, Utah
140,089	41.10	112.10	Howard Slough Wildlife Management Area, Great Salt Lake, Utah
65,220	41.50	112.20	Bear River National Wildlife Refuge, Great Salt Lake, Utah
55,011	41.00	112.10	North Farmington Bay, Great Salt Lake, Utah
53,785	39.30	118.70	Carson Lake, Nevada
52,737	39.40	119.10	Lahontan Valley, Nevada
49,893	51.90	104.10	Quill Lakes, Saskatchewan
41,905	40.90	112.10	Farmington Bay, Great Salt Lake, Utah
39,304	48.10	99.20	Minnewaukan Flats, Benson County, North Dakota
30,700	41.20	112.00	Riverdale, Great Salt Lake, Utah
26,130	39.50	118.60	Stillwater National Wildlife Refuge, Nevada
21,332	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
21,140	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
19,513	48.00	98.90	Devil's Lake, North Dakota
19,051	31.50	92.30	Catahoula Lake, Louisiana
18,642	41.30	112.20	Harold Crane Wildlife Management Area, Great Salt Lake, Utah

Appendix. *Continued.*

Short Distance Migrants

January through June (Maximum count totals = 38,124,011)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
140,215	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
95,363	41.50	112.20	Bear River National Wildlife Refuge, Great Salt Lake, Utah
58,572	41.10	112.00	Layton Marsh, Great Salt Lake, Utah
30,070	40.90	112.10	Farmington Bay, Great Salt Lake, Utah
17,664	29.50	94.60	Bolivar Flats, Texas
13,275	40.70	112.50	Riverdale, Great Salt Lake, Utah
11,965	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
8,338	41.30	112.20	Harold Crane Wildlife Management Area, Great Salt Lake, Utah
6,173	26.00	97.10	Boca Chica Beach, Cameron County, Texas
5,350	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
5,007	39.30	118.70	Carson Lake, Nevada
4,874	28.20	96.60	Matagorda National Wildlife Refuge, Texas
4,162	39.50	118.60	Stillwater National Wildlife Refuge, Nevada
4,125	30.20	92.30	Between Duson and Crowley, Louisiana
3,633	41.10	112.10	Howard Slough Wildlife Management Area, Great Salt Lake, Utah
3,371	47.70	111.30	Benton Lake National Wildlife Refuge, Montana
2,862	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
2,465	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
2,437	28.90	95.60	San Bernard National Wildlife Refuge, Texas
2,376	41.20	112.00	South shore, Great Salt Lake, Utah
2,262	51.90	104.10	Quill Lakes, Saskatchewan
2,231	41.20	112.50	Great Salt Lake, Utah
2,001	27.80	97.50	Tule Lake and Corpus Christi area, Texas
1,994	51.10	107.10	Luck Lake, Saskatchewan
1,972	27.80	97.90	Western Nueces County, Texas

July through December (Maximum count totals = 577,989)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
207,276	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
205,979	41.50	112.20	Bear River National Wildlife Refuge, Great Salt Lake, Utah
41,106	40.90	112.10	Farmington Bay, Great Salt Lake, Utah
27,901	41.10	112.00	Layton Marsh, Great Salt Lake, Utah
25,537	39.40	119.10	Lahontan Valley, Nevada
22,220	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
21,624	39.30	118.70	Carson Lake, Nevada
19,002	41.00	112.10	North Farmington Bay, Great Salt Lake, Utah
17,591	41.30	112.20	Harold Crane Wildlife Management Area, Great Salt Lake, Utah
15,230	41.20	112.30	Ogden area, Great Salt Lake, Utah
12,845	41.10	112.10	Howard Slough Wildlife Management Area, Great Salt Lake, Utah
12,823	51.10	107.10	19 kilometers west of Luck Lake, Saskatchewan
10,137	41.00	111.90	West of Interpretive Center, Great Salt Lake, Utah
6,666	39.50	118.60	Stillwater National Wildlife Refuge, Nevada
6,570	40.50	118.50	Humboldt Wildlife Management Area, Nevada
5,347	41.30	112.10	West Warren, Great Salt Lake, Utah
4,778	29.50	94.60	Bolivar Flats, Texas
4,766	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
3,722	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
3,604	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma

Appendix. *Continued.*

All Plovers

January through June (Maximum count totals = 108,872)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
13,744	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
5,324	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
4,006	30.20	92.30	Between Duson and Crowley, Louisiana
3,864	41.10	112.00	Layton Marsh area, Great Salt Lake, Utah
3,541	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
3,390	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
3,312	40.90	112.10	Farmington Bay, Great Salt Lake, Utah
3,260	40.70	112.50	Riverdale, Great Salt Lake, Utah
2,777	29.30	89.90	Grand Terre, Jefferson Parish, Louisiana
2,742	51.90	104.10	Quill Lakes, Saskatchewan
2,544	29.50	94.60	Bolivar Flats, Texas
1,800	33.50	94.00	Highway 108, Miller County, Arkansas
1,727	53.30	112.50	Beaverhill Lake, Alberta
1,666	29.90	93.20	Rice fields, Cameron County, Louisiana
1,519	29.70	94.60	Chambers County, Texas
1,503	28.90	95.10	San Luis Pass, Galveston Island, Texas
1,500	53.30	114.00	Spruce Grove, west of Edmonton, Alberta
1,449	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
1,422	28.20	96.60	Matagorda National Wildlife Refuge, Texas
1,208	36.00	95.70	Coweta sod farms, Wagoner County, Oklahoma
1,161	30.20	92.70	Between Jennings and Welsh, Louisiana
1,057	28.90	95.60	San Bernard National Wildlife Refuge, Texas
1,055	28.90	96.00	Rice field, Matagorda County, Texas
1,018	30.00	93.10	Cameron Parish, Louisiana
1,017	35.10	91.50	Georgetown, White County, Arkansas

July through December (Maximum count totals = 82,635)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
11,606	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
4,454	46.90	96.80	North Dakota State University, Fargo, North Dakota
2,400	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
2,337	30.20	92.30	Between Duson and Crowley, Louisiana
1,820	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
1,539	46.90	97.20	Casselton, North Dakota
1,339	30.20	92.70	Between Jennings and Welsh, Louisiana
1,225	49.40	98.00	Anahuac National Wildlife Refuge, Texas
1,203	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
1,196	48.00	97.10	North of Grand Forks Lagoons, North Dakota
1,049	38.20	98.60	Quivira National Wildlife Refuge, Kansas
1,034	51.90	104.10	Quill Lakes, Saskatchewan
1,009	36.20	95.90	Mohawk Park, Tulsa, Oklahoma
954	36.00	95.70	Coweta sod farms, Wagoner County, Oklahoma
893	40.40	104.10	Jackson Reservoir, Morgan County, Colorado
876	46.10	96.10	Orwell Wildlife Management Area, Minnesota
864	29.50	94.60	Bolivar Flats, Texas
861	33.40	104.50	Bitter Lake National Wildlife Refuge, New Mexico
764	27.40	97.40	64 Mile Beach, Padre Island National Seashore, Texas
760	28.10	97.20	Day County, South Dakota

Appendix. *Continued.*

All Small Sandpipers

January through June (Maximum count totals = 1,018,844)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
>190,000	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
60,159	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
45,775	48.10	99.20	Minnewaukan Flats, Devil's Lake, North Dakota
41,395	51.90	104.10	Quill Lakes, Saskatchewan
38,550	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
26,403	44.70	97.00	Dry Lake B, Clark County, South Dakota
20,728	50.40	106.60	Chaplin Lakes, Saskatchewan
20,000	53.30	112.50	Beaverhill Lake, Alberta
18,148	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
13,297	28.90	95.60	San Bernard National Wildlife Refuge, Texas
12,819	29.50	94.60	Bolivar Flats, Texas
12,343	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
12,174	38.20	98.60	Quivira National Wildlife Refuge, Kansas
11,787	30.20	92.30	Between Duson and Crowley, Louisiana
11,727	26.20	97.20	South Padre Island, Texas
11,504	47.50	100.80	Blue Lake, North Dakota
10,261	44.70	97.60	Dry Lake A, Clark County, South Dakota
10,000	52.40	110.60	Metiskow Lake, Alberta
9,640	41.10	112.00	Layton Marsh, Great Salt Lake, Utah
9,054	44.00	96.90	Milwaukee Lake, South Dakota
9,004	29.30	89.90	Grand Terre, Jefferson Parish, Louisiana
8,255	48.20	101.20	Sewage lagoons, Minot, North Dakota
6,943	48.00	98.90	Sewage ponds, Devil's Lake, North Dakota
6,477	40.70	95.60	Riverton Wildlife Area, Fremont County, Iowa
6,300	44.00	97.10	Lake County, South Dakota
6,155	51.10	107.10	Luck Lake, Saskatchewan

July through December (Maximum count totals = 548,673)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
>150,000	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
35,372	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
20,523	39.30	118.70	Carson Lake, Nevada
19,014	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
13,403	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
12,877	41.30	112.20	Harold Crane Wildlife Management Area, Great Salt Lake, Utah
10,515	51.90	104.10	Quill Lakes, Saskatchewan
10,121	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
8,722	41.50	112.20	Bear River National Wildlife Refuge, Great Salt Lake, Utah
8,158	31.50	92.30	Catahoula Lake, Louisiana
7,785	28.90	95.60	San Bernard National Wildlife Refuge, Texas
7,183	30.20	92.30	Between Duson and Crowley, Louisiana
7,022	48.10	99.20	Minnewaukan Flats, Benson County, North Dakota
5,575	41.20	101.70	Lake McConaughy, Nebraska
5,330	51.10	107.10	19 km west of Luck Lake, Saskatchewan
5,156	29.50	94.60	Bolivar Flats, Texas
5,127	28.70	96.10	Mad Island Wildlife Management Area, Texas
5,000	27.70	97.30	Oso Bay, Texas
3,900	40.50	118.50	Humboldt Wildlife Management Area, Nevada

Appendix. *Continued.*

All Medium Sandpipers

January through June (Maximum count totals = 1,073,222)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
>200,000	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
69,575	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
49,878	51.90	104.10	Quill Lakes, Saskatchewan
36,037	48.10	99.20	Minnewaukan Flats, Devil's Lake, North Dakota
27,062	39.30	118.70	Carson Lake, Nevada
26,673	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
26,321	30.20	92.30	Between Duson and Crowley, Louisiana
25,005	41.20	112.30	Ogden area, Great Salt Lake, Utah
24,936	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
22,387	29.30	89.90	Grand Terre, Jefferson Parish, Louisiana
21,138	29.50	94.60	Bolivar Flats, Texas
20,601	28.90	95.60	San Bernard National Wildlife Refuge, Texas
20,522	41.10	112.00	Layton Marsh, Great Salt Lake, Utah
20,000	52.70	110.00	Reflex Lakes, Alberta
16,483	29.60	94.60	Anahuac National Wildlife Refuge, Texas
16,265	50.40	106.60	Chaplin Lakes, Saskatchewan
15,266	51.10	105.20	Last Mountain Lake, Saskatchewan
13,805	29.90	95.90	Rice fields, Harris County and Waller County, Texas
12,773	30.00	93.10	Cameron Parish, Louisiana
12,472	28.20	96.60	Matagorda National Wildlife Refuge, Texas
12,161	41.10	112.10	Howard Slough Wildlife Management Area, Great Salt Lake, Utah
11,131	40.90	112.10	Farmington Bay, Great Salt Lake, Utah
10,154	41.30	112.20	Harold Crane Wildlife Management Area, Great Salt Lake, Utah
10,030	53.30	112.50	Beaverhill Lake, Alberta
10,000	52.40	110.20	Gillespie Lake area, Alberta
10,000	52.80	107.00	Blaine Lakes, Saskatchewan

July through December (Maximum count totals = 800,565)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
>170,000	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
60,847	51.90	104.10	Quill Lakes, Saskatchewan
54,688	48.10	99.20	Minnewaukan Flats, Benson County, North Dakota
50,387	39.40	119.10	Lahontan Valley, Nevada
49,922	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
33,991	41.50	112.20	Bear River National Wildlife Refuge, Great Salt Lake, Utah
20,212	39.30	118.70	Carson Lake, Nevada
19,057	48.00	98.90	Devil's Lake, North Dakota
15,726	31.50	92.30	Catahoula Lake, Louisiana
15,007	39.50	118.60	Stillwater National Wildlife Refuge, Nevada
14,814	46.90	96.80	North Dakota State University, Fargo, North Dakota
14,684	51.10	107.10	19 km west of Luck Lake, Saskatchewan
14,135	47.70	111.30	Benton Lake National Wildlife Refuge, Montana
11,667	43.30	94.10	Union Slough National Wildlife Refuge, Iowa
11,250	41.10	112.10	Howard Slough Wildlife Management Area, Great Salt Lake, Utah
10,287	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
10,200	40.50	118.50	Humboldt Wildlife Management Area, Nevada
9,659	30.20	92.30	Between Duson and Crowley, Louisiana
9,393	48.60	100.70	J. C. Salyer National Wildlife Refuge, North Dakota
8,293	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas

Appendix. *Continued.*

All Small Shorebirds

January through June (Maximum count totals = 1,043,224)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
>190,000	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
61,847	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
45,779	48.10	99.20	Minnewaukan Flats, Devil's Lake, North Dakota
41,788	51.90	104.10	Quill Lakes, Saskatchewan
41,657	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
26,572	44.70	97.00	Dry Lake B, Clark County, South Dakota
20,728	50.40	106.60	Chaplin Lakes, Saskatchewan
20,000	53.30	112.50	Beaverhill Lake, Alberta
19,029	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
13,755	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
13,749	29.50	94.60	Bolivar Flats, Texas
13,677	28.90	95.60	San Bernard National Wildlife Refuge, Texas
12,534	38.20	98.60	Quivira National Wildlife Refuge, Kansas
12,149	26.20	97.20	South Padre Island, Texas
11,994	30.20	92.30	Between Duson and Crowley, Louisiana
11,529	47.50	100.80	Blue Lake, North Dakota
10,307	44.70	97.60	Dry Lake A, Clark County, South Dakota
10,115	41.10	112.00	Layton Marsh, Great Salt Lake, Utah
10,000	52.40	110.60	Metiskow Lake, Alberta
9,416	29.30	89.90	Grand Terre, Jefferson Parish, Louisiana
9,375	44.00	96.90	Milwaukee Lake, South Dakota
8,311	48.20	101.20	Sewage lagoons, Minot, North Dakota
6,949	48.00	98.90	Sewage ponds, Devil's Lake, North Dakota
6,515	40.70	95.60	Riverton Wildlife Area, Fremont County, Iowa
6,304	44.00	97.10	Lake County, South Dakota
6,207	29.70	94.60	Chambers County, Texas

July through December (Maximum count totals = 562,664)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
>150,000	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
36,331	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
20,553	39.30	118.70	Carson Lake, Nevada
19,614	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
14,121	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
13,246	41.30	112.20	Harold Crane Wildlife Management Area, Great Salt Lake, Utah
11,354	51.90	104.10	Quill Lakes, Saskatchewan
10,294	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
8,825	41.50	112.20	Bear River National Wildlife Refuge, Great Salt Lake, Utah
8,183	31.50	92.30	Catahoula Lake, Louisiana
7,932	28.90	95.60	San Bernard National Wildlife Refuge, Texas
7,354	30.20	92.30	Between Duson and Crowley, Louisiana
7,053	48.10	99.20	Minnewaukan Flats, Benson County, North Dakota
5,635	29.50	94.60	Bolivar Flats, Texas
5,594	41.20	101.70	Lake McConaughy, Nebraska
5,439	51.10	107.10	19 km west of Luck Lake, Saskatchewan
5,140	28.70	96.10	Mad Island Wildlife Management Area, Texas
5,000	27.70	97.30	Oso Bay, Texas
4,035	38.20	98.60	Quivira National Wildlife Refuge, Kansas

Appendix. *Continued.*

All Medium Shorebirds

January through June (Maximum count totals = 1,809,170)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
>300,000	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
263,009	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
132,243	41.10	112.10	Howard Slough Wildlife Management Area, Great Salt Lake, Utah
98,868	41.10	112.00	Layton Marsh, Great Salt Lake, Utah
97,842	51.90	104.10	Quill Lakes, Saskatchewan
36,300	48.10	99.20	Minnewaukan Flats, Devil's Lake, North Dakota
35,574	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
34,251	52.70	109.70	Manito Lake and Wells Lake, Saskatchewan
31,181	50.40	106.60	Chaplin Lakes, Saskatchewan
30,608	30.20	92.30	Between Duson and Crowley, Louisiana
27,085	39.30	118.70	Carson Lake, Nevada
26,681	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
25,113	41.20	112.30	Ogden area, Great Salt Lake, Utah
24,851	29.30	89.90	Grand Terre, Jefferson Parish, Louisiana
23,175	29.50	94.60	Bolivar Flats, Texas
22,453	28.90	95.60	San Bernard National Wildlife Refuge, Texas
20,015	52.70	110.00	Reflex Lakes, Alberta
20,000	52.60	110.10	Kellarney Lake and Leane Lake, Alberta,
18,059	51.10	105.20	Last Mountain Lake, Saskatchewan
17,095	29.60	94.60	Anahuac National Wildlife Refuge, Texas
17,047	41.20	112.00	South shore, Great Salt Lake, Utah
16,646	29.90	95.90	Rice fields, Harris County and Waller County, Texas
15,957	53.30	112.50	Beaverhill Lake, Alberta

July through December (Maximum count totals = 1,753,824)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
383,857	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
250,013	41.00	112.20	Antelope Island, Great Salt Lake, Utah
201,462	41.10	112.00	Layton Marsh, Great Salt Lake, Utah
200,016	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
139,380	41.10	112.10	Howard Slough Wildlife Management Area, Great Salt Lake, Utah
71,299	51.90	104.10	Quill Lakes, Saskatchewan
59,234	41.50	112.20	Bear River National Wildlife Refuge, Great Salt Lake, Utah
55,011	41.00	112.10	North Farmington Bay, Great Salt Lake, Utah
54,816	48.10	99.20	Minnewaukan Flats, Benson County, North Dakota
52,264	39.40	119.10	Lahontan Valley, Nevada
40,809	40.90	112.10	Farmington Bay, Great Salt Lake, Utah
33,249	39.30	118.70	Carson Lake, Nevada
30,600	41.20	112.00	Riverdale, Great Salt Lake, Utah
26,138	39.50	118.60	Stillwater National Wildlife Refuge, Nevada
21,125	48.00	98.90	Devil's Lake, North Dakota
19,769	46.90	96.80	North Dakota State University, Fargo, North Dakota
17,382	51.10	107.10	19 km west of Luck Lake, Saskatchewan
15,782	31.50	92.30	Catahoula Lake, Louisiana
15,673	47.70	111.30	Benton Lake National Wildlife Refuge, Montana

Appendix. *Continued.*

All Large Shorebirds

January through June (Maximum count totals = 378,338)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
138,915	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
95,090	41.50	112.20	Bear River National Wildlife Refuge, Great Salt Lake, Utah
58,247	41.10	112.00	Layton Marsh, Great Salt Lake, Utah
30,021	40.90	112.10	Farmington Bay, Great Salt Lake, Utah
16,898	29.50	94.60	Bolivar Flats, Texas
16,814	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
13,015	40.70	112.50	Riverdale, Great Salt Lake, Utah
9,379	28.90	95.60	San Bernard National Wildlife Refuge, Texas
8,288	41.30	112.20	Harold Crane Wildlife Management Area, Great Salt Lake, Utah
6,141	26.00	97.10	Boca Chica Beach, Cameron County, Texas
5,064	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
5,001	39.30	118.70	Carson Lake, Nevada
4,271	28.20	96.60	Matagorda National Wildlife Refuge, Texas
4,270	51.50	109.40	Teo Lakes, Saskatchewan
3,841	39.50	118.60	Stillwater National Wildlife Refuge, Nevada
3,462	41.10	112.10	Howard Slough Wildlife Management Area, Great Salt Lake, Utah
3,127	47.70	111.30	Benton Lake National Wildlife Refuge, Montana
2,400	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
2,375	41.20	112.00	South shore, Great Salt Lake, Utah
2,275	51.90	104.10	Quill Lakes, Saskatchewan
2,225	41.20	112.50	Great Salt Lake, Utah
2,202	51.10	107.10	Luck Lake, Saskatchewan
2,001	27.80	97.50	Tule Lake and Corpus Christi area, Texas
1,800	27.80	97.90	Western Nueces County, Texas
1,493	39.80	113.30	Fish Springs National Wildlife Refuge, Utah
1,465	29.70	94.60	Chambers County, Texas

July through December (Maximum count totals = 534,768)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
206,186	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
205,645	41.50	112.20	Bear River National Wildlife Refuge, Great Salt Lake, Utah
41,058	40.90	112.10	Farmington Bay, Great Salt Lake, Utah
27,632	41.10	112.00	Layton Marsh, Great Salt Lake, Utah
25,203	39.40	119.10	Lahontan Valley, Nevada
21,613	39.30	118.70	Carson Lake, Nevada
19,000	41.00	112.10	North Farmington Bay, Great Salt Lake, Utah
17,150	41.30	112.20	Harold Crane Wildlife Management Area, Great Salt Lake, Utah
16,781	51.10	107.10	19 km west of Luck Lake, Saskatchewan
15,108	41.20	112.30	Ogden area, Great Salt Lake, Utah
12,467	41.10	112.10	Howard Slough Wildlife Management Area, Great Salt Lake, Utah
12,083	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
9,618	41.00	111.90	West of Interpretive Center, Great Salt Lake, Utah
6,600	39.50	118.60	Stillwater National Wildlife Refuge, Nevada
6,550	40.50	118.50	Humboldt Wildlife Management Area, Nevada
5,996	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
5,349	51.90	104.10	Quill Lakes, Saskatchewan
5,322	41.30	112.10	West Warren, Great Salt Lake, Utah

Appendix. *Continued.*

Black-bellied Plover *(Pluvialis squatarola)*

January through June (Maximum count totals = 33,102)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
12,103	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
3,404	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
3,341	41.10	112.00	Layton Marsh, Great Salt Lake, Utah
3,250	40.90	112.10	Farmington Bay, Great Salt Lake, Utah
3,000	40.70	112.50	Riverdale, Great Salt Lake, Utah
1,884	51.90	104.10	Quill Lakes, Saskatchewan
1,575	29.30	89.90	Grand Terre, Jefferson Parish, Louisiana
1,325	29.50	94.60	Bolivar Flats, Texas
1,200	53.30	112.50	Beaverhill Lake, Alberta
855	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
850	40.70	111.90	North Davis Sewage, Utah
656	28.90	95.60	San Bernard National Wildlife Refuge, Texas
650	41.00	111.90	West of Interpretive Center, Great Salt Lake, Utah
625	28.90	95.10	San Luis Pass, Galveston Island, Texas
600	50.20	111.80	Rolling Hills, Alberta
483	27.40	97.40	Padre Island National Seashore, Texas
423	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
375	28.20	96.60	Matagorda National Wildlife Refuge, Texas
315	28.20	96.90	Aransas National Wildlife Refuge, Texas
307	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
300	41.10	112.10	Howard Slough Wildlife Management Area, Great Salt Lake, Utah
293	33.40	104.50	Bitter Lake National Wildlife Refuge, New Mexico
284	26.20	97.20	South Padre Island, Texas
281	29.60	94.50	Rice fields, Rollover Bay, Chambers County, Texas
275	48.80	102.10	Des Lacs Valley, North Dakota
272	30.20	92.30	Between Duson and Crowley, Louisiana
250	51.60	104.70	Kutawagon Lakes, Saskatchewan
250	28.70	96.10	Mad Island Wildlife Management Area, Texas

July through December (Maximum count totals = 11,992)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
1,770	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
760	28.10	97.20	Bayside marshes, Refugio County, Texas
603	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
600	28.30	96.80	Burgentine Lake, Aransas National Wildlife Refuge, Texas
500	29.70	94.80	Trinity Bay, Texas
421	38.20	98.60	Quivira National Wildlife Refuge, Kansas
400	42.80	106.30	Casper, Wyoming
400	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
384	29.50	94.60	Bolivar Flats, Texas
350	48.00	97.30	Kellys Slough National Wildlife Refuge, North Dakota
305	30.10	92.90	Between Lake Arthur and Holmwood, Louisiana
300	46.30	96.50	Breckenridge Sewage Lagoons, Minnesota
300	28.70	96.10	Mad Island Wildlife Management Area, Texas
263	51.10	107.10	Luck Lake, Saskatchewan
255	29.00	95.40	Eagle Lake, Texas
250	46.90	96.80	North Dakota State University, Fargo, North Dakota
245	33.40	104.50	Bitter Lake National Wildlife Refuge, New Mexico

Appendix. *Continued.*

American Golden Plover *(Pluvialis dominica)*

January through June (Maximum count totals = 31,220)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
1,800	33.50	94.00	Highway 108, Miller County, Arkansas
1,656	29.90	93.20	Rice fields, Cameron County, Louisiana
1,500	53.30	114.00	Spruce Grove, west of Edmonton, Alberta
1,148	36.00	95.70	Coweta sod farms, Wagoner County, Oklahoma
1,000	35.10	91.50	Georgetown, White County, Arkansas
1,000	27.80	97.40	Corpus Christi, Texas
900	36.00	95.60	Wagoner County, Oklahoma
900	28.90	96.00	Rice field, Matagorda County, Texas
786	42.10	93.10	North of Clemons, Marshall County, Iowa
700	35.60	95.30	Muskogee County, Oklahoma
600	29.30	89.90	Terril, Dickinson County, Iowa
600	30.00	93.10	Cameron Parish, Louisiana
600	43.30	95.00	Grand Terre, Jefferson Parish, Louisiana
550	28.50	96.60	Magnolia Beach, Indianola Island, Calhoun County, Texas
526	53.30	112.50	Beaverhill Lake, Alberta
500	41.80	91.50	Coralville Reservoir, Johnson County, Iowa
500	50.80	104.90	Valeport Marsh, Saskatchewan
500	46.10	96.10	Orwell Wildlife Management Area, Minnesota
438	33.60	94.00	Five miles east of Ogden, Little River County, Arkansas
422	51.90	104.10	Quill Lakes, Saskatchewan
400	46.30	96.50	Breckenridge sewage lagoons, Minnesota
400	42.00	94.40	Southwestern Greene County, Iowa
392	30.20	92.30	Between Duson and Crowley, Louisiana
300	46.00	97.40	Tewaukon National Wildlife Refuge, North Dakota
300	27.20	98.10	Falfurrias, Texas
300	44.00	95.90	Murray County, Minnesota

July through December (Maximum count totals = 14,763)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
4,000	46.90	96.80	North Dakota State University, Fargo, North Dakota
1,500	46.90	97.20	Casselton, North Dakota
1,225	49.40	98.00	Jordan, Manitoba
900	48.00	97.10	Grand Forks Lagoons area, North Dakota
542	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
500	46.10	96.10	Orwell Wildlife Management Area, Minnesota
492	41.80	93.70	Saylorville Reservoir, Polk County, Iowa
400	48.40	97.70	Walsh County, North Dakota
400	49.90	97.10	Winnipeg, Manitoba
312	52.30	102.70	Buck Lake, Saskatchewan
300	46.30	96.50	Breckenridge sewage lagoons, Minnesota
260	48.00	97.30	Kellys Slough National Wildlife Refuge, North Dakota
220	41.70	94.30	Bays Branch, Guthrie Center, Iowa
200	43.70	96.20	Blue Mounds, Rock County, Minnesota
188	41.70	93.60	Moeckley Prairie, Polk County, Iowa
160	44.80	96.60	Rush Lake, Deuel County, South Dakota
150	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
150	47.80	96.60	Polk County, Minnesota

Appendix. *Continued.*

Snowy Plover (*Charadrius alexandrinus*)

January through June (Maximum count totals = 7,048)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
1,964	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
1,107	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
680	41.70	113.00	Locomotive Springs, Great Salt Lake, Utah
322	39.50	118.60	Stillwater National Wildlife Refuge, Nevada
306	41.10	112.00	Layton Marsh, Great Salt Lake, Utah
282	38.20	98.60	Quivira National Wildlife Refuge, Kansas
279	33.40	104.50	Bitter Lake National Wildlife Refuge, New Mexico
240	40.70	112.50	Riverdale, Great Salt Lake, Utah
220	41.50	112.30	West shore, Bear River National Wildlife Refuge, Great Salt Lake, Utah
203	41.00	111.90	West of Interpretive Center, Great Salt Lake, Utah
176	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
170	39.80	113.30	Fish Springs National Wildlife Refuge, Utah
169	28.20	96.60	Matagorda National Wildlife Refuge, Texas
161	41.70	112.70	Salt Wells Flats, Great Salt Lake, Utah
160	41.50	112.20	Bear River National Wildlife Refuge, Great Salt Lake, Utah
150	29.50	94.60	Bolivar Flats, Texas
107	41.10	112.10	Howard Slough Wildlife Management Area, Great Salt Lake, Utah
107	40.70	111.90	North Davis Sewage, Utah
82	26.20	97.20	South Padre Island, Texas
69	40.80	112.50	Stansbury Island, Utah
62	28.90	95.10	San Luis Pass, Galveston Island, Texas
61	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
55	41.20	112.30	Ogden area, Great Salt Lake, Utah
50	41.60	113.10	Crocodile Mountain, Utah
50	41.30	112.10	West Warren, Great Salt Lake, Utah

July through December (Maximum count totals = 5,484)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
882	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
689	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
519	41.00	111.90	West of Interpretive Center, Great Salt Lake, Utah
471	40.70	111.90	North Davis Sewage, Utah
340	41.30	112.20	Harold Crane Wildlife Management Area, Great Salt Lake, Utah
313	38.20	98.60	Quivira National Wildlife Refuge, Kansas
265	33.40	104.50	Bitter Lake National Wildlife Refuge, New Mexico
255	41.70	112.90	Locomotive Springs, Great Salt Lake, Utah
250	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
250	41.10	112.10	Howard Slough Wildlife Management Area, Great Salt Lake, Utah
188	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
129	27.40	97.40	Padre Island National Seashore, Texas
116	39.80	113.30	Fish Springs National Wildlife Refuge, Utah
115	41.40	113.00	Fingerpoint, Utah
111	28.20	96.60	Matagorda National Wildlife Refuge, Texas
100	41.50	112.20	Bear River National Wildlife Refuge, Great Salt Lake, Utah
79	41.70	112.70	Salt Wells Flats, Great Salt Lake, Utah
76	26.00	97.20	Port Isabel, South Padre Island, Texas
62	39.50	118.60	Stillwater National Wildlife Refuge, Nevada
50	41.20	112.50	Great Salt Lake, Utah

Appendix. *Continued.*

Wilson's Plover (*Charadrius wilsonia*)

January through June (Maximum count totals = 1,278)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
333	27.40	97.40	Padre Island National Seashore, Texas
175	28.90	95.10	San Luis Pass, Galveston Island, Texas
131	28.20	96.60	Matagorda National Wildlife Refuge, Texas
105	28.90	95.60	San Bernard National Wildlife Refuge, Texas
90	29.50	94.60	Bolivar Flats, Texas
66	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
53	29.30	89.90	Grand Terre Island, Jefferson Parish, Louisiana
51	28.80	95.60	Sargent Island, Texas
47	29.10	90.20	Fourchon Beach, Louisiana
41	28.10	97.10	Near Aransas National Wildlife Refuge including Copano Bay, Texas
35	26.20	97.20	South Padre Island, Texas
16	27.80	97.10	Airport, Port Aransas, Texas
14	28.20	96.90	Aransas National Wildlife Refuge, Texas
12	29.70	90.10	Jefferson Parish, Louisiana
11	27.70	97.60	Southwest of Corpus Christi, Nueces County, Texas
10	27.70	97.20	Mustang Island Beach, Texas
9	28.00	97.10	Rockport area, Texas
9	29.20	95.80	Big Reef, Galveston Island, Texas
9	29.40	94.60	Shore east of Bolivar Flats, Galveston Island, Texas
8	30.00	90.20	Jefferson Parish, Louisiana
8	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
5	28.30	96.90	Burgentine Lake, Aransas County, Texas
5	28.70	96.10	Mad Island Wildlife Management Area, Texas

July through December (Maximum count totals = 1,051)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
272	27.40	97.40	Padre Island National Seashore, Texas
143	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
134	29.50	94.60	Bolivar Flats, Texas
127	27.80	97.10	Airport, Port Aransas, Texas
122	28.20	96.60	Matagorda National Wildlife Refuge, Texas
80	29.90	93.20	Rice fields, Cameron County, Louisiana
40	28.30	96.80	Burgentine Lake, Aransas National Wildlife Refuge, Texas
30	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
17	28.90	95.60	San Bernard National Wildlife Refuge, Texas
17	26.10	97.20	South Padre Island, Texas
15	29.20	95.80	Big Reef, Galveston Island, Texas
11	27.70	97.20	Mustang Island Beach, Texas
8	26.00	97.10	Boca Chica Beach, Cameron County, Texas
6	28.90	96.00	Rice field, Matagorda County, Texas
6	26.00	97.30	Highway 48 between Brownsville and Padre Island, Texas
6	28.00	97.10	Rockport area, Texas
6	28.10	96.90	Aransas County, Texas

Appendix. *Continued.*

Semipalmated Sandpiper *(Calidris pusilla)*

January through June (Maximum count totals = 260,709)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
>60,000	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
15,000	48.10	99.20	Minnewaukan Flats, Devil's Lake, North Dakota
12,970	51.90	104.10	Quill Lakes, Saskatchewan
9,668	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
9,218	44.70	97.00	Dry Lake B, Clark County, South Dakota
7,987	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
6,000	47.50	100.80	Blue Lake, North Dakota
5,997	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
4,415	48.00	98.90	Sewage ponds, Devil's Lake, North Dakota
4,022	29.90	95.90	Rice fields in Harris County and Waller County, Texas
4,000	40.70	95.60	Riverton Wildlife Area, Fremont County, Iowa
4,000	51.10	107.10	Luck Lake, Saskatchewan
3,590	50.40	106.60	Chaplin Lakes, Saskatchewan
3,400	48.20	101.20	Sewage lagoons, Minot, North Dakota
3,331	38.20	98.60	Quivira National Wildlife Refuge, Kansas
3,015	30.20	92.30	Between Duson and Crowley, Louisiana
2,759	44.70	97.60	Dry Lake A, Clark County, South Dakota
2,650	34.80	92.00	Lonoke County, Arkansas
2,110	44.00	96.90	Milwaukee Lake, South Dakota
2,069	26.20	97.20	South Padre Island, Texas
2,000	47.60	101.20	Audubon National Wildlife Refuge, North Dakota
2,000	29.50	94.60	Bolivar Flats, Texas
1,800	47.60	101.00	Lake Nettie National Wildlife Refuge, North Dakota

July through December (Maximum count totals = 91,453)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
43,250	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
7,000	48.10	99.20	Minnewaukan Flats, Devil's Lake, North Dakota
3,615	51.90	104.10	Quill Lakes, Saskatchewan
3,000	47.90	100.20	Border of McHenry County and Wells County, North Dakota
2,753	31.50	92.30	Catahoula Lake, Louisiana
2,025	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
2,015	51.10	107.10	Luck Lake, Saskatchewan
1,890	28.90	95.60	San Bernard National Wildlife Refuge, Texas
1,651	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
1,500	46.90	96.80	North Dakota State University, Fargo, North Dakota
1,460	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
1,200	48.00	98.90	Devil's Lake, North Dakota
1,005	51.10	105.20	Last Mountain Lake, Saskatchewan
1,000	48.00	97.10	Grand Forks Lagoons area, North Dakota
850	30.20	92.30	Between Duson and Crowley, Louisiana
705	46.90	97.20	Casselton, North Dakota
700	48.20	101.20	Sewage lagoons, Minot, North Dakota
602	38.20	98.60	Quivira National Wildlife Refuge, Kansas
600	46.10	96.10	Orwell Wildlife Management Area, Minnesota
600	47.90	97.40	Grand Forks County, North Dakota
600	28.30	96.80	Burgentine Lake, Aransas National Wildlife Refuge, Texas

Appendix. *Continued.*

Piping Plover (*Charadrius melodus*)

January through June (Maximum count totals = 2,931)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
303	28.20	96.60	Matagorda National Wildlife Refuge, Texas
300	29.50	94.60	Bolivar Flats, Texas
201	26.20	97.20	South Padre Island, Texas
180	28.90	95.10	San Luis Pass, Galveston Island, Texas
180	29.30	94.80	Galveston, Texas
172	26.00	97.20	Port Isabel, South Padre Island, Texas
119	27.70	97.20	Mustang Island Beach, Texas
110	28.10	96.90	Aransas County, Texas
104	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
100	27.80	97.10	Airport, Port Aransas, Texas
80	29.30	89.90	Grand Terre Island, Jefferson Parish, Louisiana
68	51.90	104.10	Quill Lakes, Saskatchewan
66	41.20	101.70	Lake McConaughy, Nebraska
46	52.70	110.00	Reflex Lakes, Alberta
45	29.40	95.00	Texas City, Texas
41	29.40	94.60	Shore east of Bolivar Flats, Galveston Island, Texas
41	28.50	96.60	Magnolia Beach, Indianola Island, Calhoun County, Texas
40	48.20	101.50	Minot, North Dakota
40	47.30	100.70	Chain of Lakes, McLean County, North Dakota
35	29.20	95.00	West Galveston Island, Texas
32	26.10	97.20	South Padre Island, Texas
32	29.20	95.80	Big Reef, Galveston Island, Texas
32	27.40	97.40	Padre Island National Seashore, Texas
26	28.80	95.60	Sargent Island, Texas
25	47.50	100.80	Blue Lake, North Dakota
25	48.90	94.70	Pine and Curry Island, Minnesota
22	26.00	97.10	Boca Chica Beach, Cameron County, Texas
18	47.30	102.70	Lake Ilo National Wildlife Refuge, North Dakota

July through December (Maximum count totals = 1,681)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
200	29.50	94.60	Bolivar Flats, Texas
200	27.40	97.40	Padre Island National Seashore, Texas
175	27.80	97.10	Airport, Port Aransas, Texas
160	27.70	97.20	Mustang Island Beach, Texas
107	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
76	28.20	96.60	Matagorda National Wildlife Refuge, Texas
71	27.60	97.80	Beach on border of Nueces County and Kleberg County, Texas
70	29.40	94.70	Bolivar Peninsula, Texas
65	26.00	97.10	Boca Chica Beach, Cameron County, Texas
61	26.00	97.20	Port Isabel, South Padre Island, Texas
42	51.90	104.10	Quill Lakes, Saskatchewan
39	29.20	95.80	Big Reef, Galveston Island, Texas
38	28.00	97.10	Rockport area, Texas
35	28.90	96.00	Rice field, Matagorda County, Texas
28	28.90	95.50	San Bernard, Texas
21	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
19	28.20	96.90	Aransas National Wildlife Refuge, Texas

Appendix. *Continued.*

Killdeer (*Charadrius vociferus*)

January through June (Maximum count totals = 18,860)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
3,135	30.20	92.30	Between Duson and Crowley, Louisiana
1,795	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
1,000	43.30	96.20	Doon, Lyon County, Iowa
932	30.20	92.70	Between Jennings and Welsh, Louisiana
650	36.30	90.00	Rice fields, Stoddard County, Missouri
520	40.70	95.60	Riverton Wildlife Area, Fremont County, Iowa
370	36.20	95.90	Mohawk Park, Tulsa, Oklahoma
360	30.00	93.10	Cameron Parish, Louisiana
325	48.60	101.60	Upper Souris National Wildlife Refuge, North Dakota
308	33.40	104.50	Bitter Lake National Wildlife Refuge, New Mexico
294	32.20	91.30	Tensas River National Wildlife Refuge, Louisiana
255	30.10	92.90	Between Lake Arthur and Holmwood, Louisiana
253	48.20	101.50	Minot, North Dakota
248	47.70	111.30	Benton Lake National Wildlife Refuge, Montana
219	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
200	33.90	96.80	Hagerman National Wildlife Refuge, Texas
200	36.70	95.70	Farm ponds, Washington County, Oklahoma
190	29.30	89.90	Grand Terre, Jefferson Parish, Louisiana
175	41.70	102.50	Crescent Lake National Wildlife Refuge, Nebraska

July through December (Maximum count totals = 39,392)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
8,940	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
1,940	30.20	92.30	Between Duson and Crowley, Louisiana
1,315	30.20	92.70	Between Jennings and Welsh, Louisiana
1,000	36.20	95.90	Mohawk Park, Tulsa, Oklahoma
941	36.00	95.70	Coweta sod farms, Wagoner County, Oklahoma
674	40.40	104.10	Jackson Reservoir, Morgan County, Colorado
630	39.90	104.90	Barr Lake State Park, Colorado
544	43.30	94.10	Union Slough National Wildlife Refuge, Iowa
511	41.70	93.60	Polk County, Iowa
450	33.90	96.80	Hagerman National Wildlife Refuge, Texas
401	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
401	29.00	95.40	Eagle Lake, Texas
400	45.20	97.10	Berger Wildlife Production Area, near Waubay, South Dakota
358	33.80	91.30	Oakwood Unit, Overflow National Wildlife Refuge, Arkansas
335	33.40	104.50	Bitter Lake National Wildlife Refuge, New Mexico
330	42.00	94.40	Southwestern Greene County, Iowa
327	36.00	95.60	Wagoner County, Oklahoma
320	30.10	92.90	Between Lake Arthur and Holmwood, Louisiana
316	35.90	95.90	Arkansas River at Bixby, Tulsa County, Oklahoma
311	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
300	36.20	94.10	Springdale, Benton County, Arkansas
300	45.30	97.10	Pearson Wildlife Production Area, near Waubay, South Dakota
300	43.00	94.50	Fields near West Bend, Kossuth County, Iowa
300	39.40	119.10	Lahontan Valley, Nevada
300	36.10	95.90	Tulsa County, Oklahoma
300	35.50	97.70	Canadian County, Oklahoma

Appendix. *Continued.*

Mountain Plover (*Charadrius montanus*)

January through June (Maximum count totals = 1,334)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
252	29.50	94.60	Bolivar Flats, Texas
150	28.90	96.00	Rice field, Matagorda County, Texas
104	27.70	97.60	Nueces County, Texas
100	29.80	97.90	North Guadalupe County, Texas
100	27.20	98.10	Falfurrias, Texas
64	29.70	98.00	New Braunfels Airport, Comal County, Texas
50	28.00	97.70	Edroy, Texas
50	30.60	97.30	Granger Lake, Williamson County, Texas
50	27.70	97.70	Driscoll, Texas
36	38.00	103.50	Southeastern Colorado
35	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
30	28.00	97.50	East of Sinton, San Patricio County, Texas
25	28.60	96.50	Magnolia Beach, Indianola Island, Calhoun County, Texas
24	48.30	109.30	Between Cleveland and Lloyd, Montana
24	30.70	97.60	Williamson County, Texas
22	27.30	97.80	Riviera, Kleberg County, Texas
20	27.90	97.20	Ingleside, San Patricio County, Texas
14	38.30	103.30	Adobe Creek Reservoir, Colorado
12	29.90	95.90	Rice fields in Harris County and Waller County, Texas
11	32.10	96.50	Corsicana, Texas
11	33.30	95.80	Klondike, Delta County, Texas
10	27.60	97.80	Nueces County, Texas

July through December (Maximum count totals = 2,497)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
425	38.00	103.50	Southeastern Colorado
244	37.90	101.30	West of Lakin, Kearny County, Kansas
200	31.20	99.80	Eden, Concho County, Texas
200	29.30	99.60	2 miles south of Knippa, Uvalde County, Texas
200	40.40	104.10	Jackson Reservoir, Morgan County, Colorado
200	37.10	101.60	Morton County, Kansas
150	37.30	102.00	Cimarron River Valley, Morton County, Kansas
100	44.50	109.10	Cody, Wyoming
100	37.40	102.30	Walsh, Colorado
100	38.30	102.80	Nee Grande Reservoir, Kiowa County, Colorado
83	40.80	104.00	Pawnee National Grasslands, Colorado
80	37.20	101.80	Morton County, Kansas
60	37.10	102.00	South of Highway 51 near Colorado, Morton County, Kansas
55	35.00	106.00	Moriarty, New Mexico
50	37.60	102.40	Two Buttes, Colorado
50	27.90	97.40	South of Taft, San Patricio County, Texas
36	34.80	106.70	Los Lunas, New Mexico
26	38.10	103.70	Rocky Ford, Colorado
24	30.60	97.30	Granger Lake, Williamson County, Texas
20	32.80	98.10	Mineral Wells, Palo Pinto County, Texas
19	28.70	96.70	Northwest of Port Lavaca, Texas
17	29.70	98.00	New Braunfels Airport, Comal County, Texas

Appendix. *Continued.*

Black-necked Stilt *(Himantopus himantopus)*

January through June (Maximum count totals = 111,636)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
60,741	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
37,125	41.50	112.20	Bear River National Wildlife Refuge, Great Salt Lake, Utah
35,520	41.10	112.00	Layton Marsh, Great Salt Lake, Utah
22,040	40.90	112.10	Farmington Bay, Great Salt Lake, Utah
3,000	41.30	112.20	Harold Crane Wildlife Management Area, Great Salt Lake, Utah
2,300	39.50	118.60	Stillwater National Wildlife Refuge, Nevada
1,500	40.70	112.50	Riverdale, Great Salt Lake, Utah*
1,000	39.30	118.70	Carson Lake, Nevada
849	39.80	113.30	Fish Springs National Wildlife Refuge, Utah
840	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
829	33.40	104.50	Bitter Lake National Wildlife Refuge, New Mexico
800	41.10	112.10	Howard Slough Wildlife Management Area, Great Salt Lake, Utah
575	30.20	92.30	Between Duson and Crowley, Louisiana
407	28.90	95.60	San Bernard National Wildlife Refuge, Texas
405	41.20	112.00	South shore, Great Salt Lake, Utah
240	29.90	95.90	Rice fields in Harris County and Waller County, Texas
200	41.20	112.50	Great Salt Lake, Utah
200	41.30	112.10	West Warren, Great Salt Lake, Utah

July through December (Maximum count totals = 119,958)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
66,650	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
66,650	41.50	112.20	Bear River National Wildlife Refuge, Great Salt Lake, Utah
11,000	40.90	112.10	Farmington Bay, Great Salt Lake, Utah
6,300	39.50	118.60	Stillwater National Wildlife Refuge, Nevada
6,100	41.10	112.00	Layton Marsh, Great Salt Lake, Utah
4,000	41.00	112.10	North Farmington Bay, Great Salt Lake, Utah
3,100	41.00	111.90	West of Interpretive Center, Great Salt Lake, Utah
3,000	41.30	112.20	Harold Crane Wildlife Management Area, Great Salt Lake, Utah
2,565	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
2,300	41.10	112.10	Howard Slough Wildlife Management Area, Great Salt Lake, Utah
1,790	28.90	95.60	San Bernard National Wildlife Refuge, Texas
1,380	31.50	92.30	Catahoula Lake, Louisiana
1,164	39.80	113.30	Fish Springs National Wildlife Refuge, Utah
750	37.70	113.10	Cedar City, Utah
735	30.20	92.30	Between Duson and Crowley, Louisiana
630	33.80	91.30	Oakwood Unit, Overflow National Wildlife Refuge, Arkansas
580	41.30	112.10	West Warren, Great Salt Lake, Utah
500	41.20	112.00	South shore, Great Salt Lake, Utah
445	30.10	92.90	Between Lake Arthur and Holmwood, Louisiana
428	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
400	41.20	112.30	Ogden area, Great Salt Lake, Utah
370	39.30	118.70	Carson Lake, Nevada
350	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
350	29.00	96.00	Bay City, Texas
321	33.40	104.50	Bitter Lake National Wildlife Refuge, New Mexico
283	38.40	115.10	Kirch Wildlife Management Area, Nevada
229	27.80	97.10	Airport, Port Aransas, Texas

Appendix. *Continued.*

American Avocet (*Recurvirostra americana*)

January through June (Maximum count totals = 149,760)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
40,944	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
31,005	41.50	112.20	Bear River National Wildlife Refuge, Great Salt Lake, Utah
21,560	41.10	112.00	Layton Marsh, Great Salt Lake, Utah
14,653	29.50	94.60	Bolivar Flats, Texas
7,775	40.90	112.10	Farmington Bay, Great Salt Lake, Utah
6,538	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
6,000	40.70	112.50	Riverdale, Great Salt Lake, Utah
6,000	26.00	97.10	Boca Chica Beach, Cameron County, Texas
4,308	41.30	112.20	Harold Crane Wildlife Management Area, Great Salt Lake, Utah
4,000	39.30	118.70	Carson Lake, Nevada
3,190	28.20	96.60	Matagorda National Wildlife Refuge, Texas
2,400	47.70	111.30	Benton Lake National Wildlife Refuge, Montana
2,035	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
2,000	27.80	97.50	Tule Lake and Corpus Christi area, Texas
2,000	41.10	112.10	Howard Slough Wildlife Management Area, Great Salt Lake, Utah
1,693	41.20	112.00	South shore, Great Salt Lake, Utah
1,400	39.50	118.60	Stillwater National Wildlife Refuge, Nevada
1,030	41.20	112.40	Promontory Point, Great Salt Lake, Utah
1,003	41.00	111.90	West of Interpretive Center, Great Salt Lake, Utah
1,000	41.20	112.30	Ogden area, Great Salt Lake, Utah
876	51.10	107.10	Luck Lake, Saskatchewan
851	28.10	97.10	Near Aransas National Wildlife Refuge including Copano Bay, Texas
826	51.90	104.10	Quill Lakes, Saskatchewan
744	28.90	95.60	San Bernard National Wildlife Refuge, Texas
730	41.50	112.30	West shore, Bear River National Wildlife Refuge, Great Salt Lake, Utah
650	48.30	100.00	Granville, McHenry County, North Dakota
586	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
558	40.30	105.10	Berthoud, Colorado

July through December (Maximum count totals = 325,291)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
103,320	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
103,320	41.50	112.20	Bear River National Wildlife Refuge, Great Salt Lake, Utah
30,000	40.90	112.10	Farmington Bay, Great Salt Lake, Utah
25,000	39.40	119.10	Lahontan Valley, Nevada
21,200	41.10	112.00	Layton Marsh, Great Salt Lake, Utah
21,000	39.30	118.70	Carson Lake, Nevada
15,000	41.00	112.10	North Farmington Bay, Great Salt Lake, Utah
14,600	41.20	112.30	Ogden area, Great Salt Lake, Utah
13,657	41.30	112.20	Harold Crane Wildlife Management Area, Great Salt Lake, Utah
11,819	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
10,000	41.10	112.10	Howard Slough Wildlife Management Area, Great Salt Lake, Utah
6,500	40.50	118.50	Humboldt Wildlife Management Area, Nevada
6,500	41.00	111.90	West of Interpretive Center, Great Salt Lake, Utah
4,550	41.30	112.10	West Warren, Great Salt Lake, Utah
4,000	29.50	94.60	Bolivar Flats, Texas
3,000	41.20	112.50	Great Salt Lake, Utah
2,685	50.40	106.60	Chaplin Lakes, Saskatchewan

Appendix. *Continued.*

Greater Yellowlegs (*Tringa melanoleuca*)

January through June (Maximum count totals = 20,816)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
10,000	30.00	93.10	Cameron Parish, Louisiana
1,700	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
1,200	29.80	92.30	Rice field, Vermilion Parish, Louisiana
722	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
500	43.70	91.50	Houston County, Minnesota
442	30.20	92.30	Between Duson and Crowley, Louisiana
315	30.10	92.90	Between Lake Arthur and Holmwood, Louisiana
299	38.20	98.60	Quivira National Wildlife Refuge, Kansas
245	30.20	92.70	Between Jennings and Welsh, Louisiana
205	29.90	92.30	Fields and ponds southwest of Abbeville, Louisiana
181	39.30	95.30	Lonestar Lake, near Lawrence, Kansas
179	28.70	96.10	Mad Island Wildlife Management Area, Texas
177	29.90	95.90	Rice fields in Harris County and Waller County, Texas
152	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
129	44.70	97.00	Dry Lake B, Clark County, South Dakota
107	28.90	95.60	San Bernard National Wildlife Refuge, Texas
100	34.70	91.90	Anderson's Fish Hatchery, Lonoke County, Arkansas

July through December (Maximum count totals = 20,157)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
8,600	51.90	104.10	Quill Lakes, Saskatchewan
1,625	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
1,047	47.70	111.30	Benton Lake National Wildlife Refuge, Montana
800	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
455	31.50	92.30	Catahoula Lake, Louisiana
314	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
275	48.00	98.90	Sewage ponds, Devil's Lake, North Dakota
211	47.60	101.20	Audubon National Wildlife Refuge, North Dakota
202	33.40	104.50	Bitter Lake National Wildlife Refuge, New Mexico
200	51.10	107.10	Luck Lake, Saskatchewan
192	48.10	99.20	Minnewaukan Flats, Devil's Lake, North Dakota
177	38.20	98.60	Quivira National Wildlife Refuge, Kansas
176	41.50	93.40	South of Runnells, Polk County, Iowa
169	30.20	92.30	Between Duson and Crowley, Louisiana
155	39.40	119.10	Lahontan Valley, Nevada
153	29.00	95.40	Eagle Lake, Texas
125	39.80	113.30	Fish Springs National Wildlife Refuge, Utah
111	28.70	96.10	Mad Island Wildlife Management Area, Texas
100	48.00	99.50	Benson County, North Dakota
96	46.30	96.50	Breckenridge sewage lagoons, Minnesota
95	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
94	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
91	40.60	99.30	Rainwater Basin, Nebraska
89	40.90	112.10	Farmington Bay, Great Salt Lake, Utah
87	47.80	101.30	Wetlands in McLean and Ward counties, North Dakota
85	48.20	101.20	Sewage lagoons, Minot, North Dakota
84	36.40	104.40	Maxwell National Wildlife Refuge, New Mexico
80	30.10	92.90	Between Lake Arthur and Holmwood, Louisiana

Appendix. *Continued.*

Lesser Yellowlegs *(Tringa flavipes)*

January through June (Maximum count totals = 79,388)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
21,023	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
6,238	28.90	95.60	San Bernard National Wildlife Refuge, Texas
4,955	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
4,490	30.20	92.30	Between Duson and Crowley, Louisiana
3,348	30.20	92.70	Between Jennings and Welsh, Louisiana
2,500	29.60	94.60	Anahuac National Wildlife Refuge, Texas
2,246	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
2,027	29.30	89.90	Grand Terre, Jefferson Parish, Louisiana
2,000	30.00	93.10	Cameron Parish, Louisiana
2,000	40.70	112.50	Riverdale, Great Salt Lake, Utah
1,355	30.10	92.90	Between Lake Arthur and Holmwood, Louisiana
1,330	48.80	95.80	Roseau County, Minnesota
1,230	30.30	92.40	Acadia Parish, Louisiana
1,218	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
1,176	46.10	96.10	Orwell Wildlife Management Area, Minnesota
1,000	47.90	97.00	Eastern North Dakota
1,000	44.40	95.30	Redwood County, Minnesota
975	48.30	100.60	Denbigh, North Dakota
875	42.00	94.40	Southwestern Greene County, Iowa
818	38.20	98.60	Quivira National Wildlife Refuge, Kansas
730	40.70	95.60	Riverton Wildlife Area, Fremont County, Iowa
653	36.70	95.60	Oolagah Reservoir, Nowata County, Oklahoma
635	28.80	95.90	Matagorda County, Texas

July through December (Maximum count totals = 135,663)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
52,140	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
13,600	51.90	104.10	Quill Lakes, Saskatchewan
7,000	46.90	96.80	North Dakota State University, Fargo, North Dakota
6,000	43.30	94.10	Union Slough National Wildlife Refuge, Iowa
3,095	31.50	92.30	Catahoula Lake, Louisiana
3,035	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
2,500	47.60	99.70	Wells County, North Dakota
2,160	28.90	95.60	San Bernard National Wildlife Refuge, Texas
1,850	51.10	107.10	Luck Lake, Saskatchewan
1,800	48.00	97.10	Grand Forks Lagoons area, North Dakota
1,600	46.10	96.10	Orwell Wildlife Management Area, Minnesota
1,600	47.90	97.40	Grand Forks County, North Dakota
1,595	30.20	92.30	Between Duson and Crowley, Louisiana
1,501	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
1,351	48.20	101.20	Sewage lagoons, Minot, North Dakota
1,200	43.00	94.50	Fields near West Bend, Kossuth County, Iowa
1,194	41.70	93.60	Polk County, Iowa
1,155	30.00	92.10	Rice fields in Lafayette Parish and Vermilion Parish, Louisiana
1,047	47.70	111.30	Benton Lake National Wildlife Refuge, Montana
1,032	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
1,000	48.10	99.20	Minnewaukan Flats, Devil's Lake, North Dakota
1,000	48.20	101.50	Minot, North Dakota

Appendix. *Continued.*

All Yellowlegs

January through June (Maximum count totals = 114,254)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
22,723	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
12,000	30.00	93.10	Cameron Parish, Louisiana
9,263	51.90	104.10	Quill Lakes, Saskatchewan
7,432	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
6,345	28.90	95.60	San Bernard National Wildlife Refuge, Texas
4,932	30.20	92.30	Between Duson and Crowley, Louisiana
3,593	30.20	92.70	Between Jennings and Welsh, Louisiana
2,652	29.60	94.60	Anahuac National Wildlife Refuge, Texas
2,476	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
2,267	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
2,097	29.30	89.90	Grand Terre, Jefferson Parish, Louisiana
2,005	40.70	112.50	Riverdale, Great Salt Lake, Utah
1,803	38.20	98.60	Quivira National Wildlife Refuge, Kansas
1,670	30.10	92.90	Between Lake Arthur and Holmwood, Louisiana
1,331	48.80	95.80	Roseau County, Minnesota
1,251	46.10	96.10	Orwell Wildlife Management Area, Minnesota
1,230	30.30	92.40	Acadia Parish, Louisiana
1,200	29.80	92.30	Rice field, Vermilion County, Louisiana
1,122	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
1,017	48.30	100.60	Denbigh, North Dakota
1,016	47.90	97.00	Grand Forks, North Dakota

July through December (Maximum count totals = 163,967)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
53,765	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
22,200	51.90	104.10	Quill Lakes, Saskatchewan
7,025	46.90	96.80	North Dakota State University, Fargo, North Dakota
6,058	43.30	94.10	Union Slough National Wildlife Refuge, Iowa
5,400	50.20	97.10	Oak Hammock Marsh, Manitoba
3,550	31.50	92.30	Catahoula Lake, Louisiana
3,320	51.10	107.10	19 km west of Luck Lake, Saskatchewan
3,129	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
2,881	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
2,500	47.60	99.70	Wells County, North Dakota
2,209	28.90	95.60	San Bernard National Wildlife Refuge, Texas
2,094	47.70	111.30	Benton Lake National Wildlife Refuge, Montana
1,818	48.00	97.10	North of Grand Forks Lagoons, North Dakota
1,764	30.20	92.30	Between Duson and Crowley, Louisiana
1,668	47.90	97.40	Duluth, Minnesota
1,654	46.10	96.10	Orwell Wildlife Management Area, Minnesota
1,530	38.20	98.60	Quivira National Wildlife Refuge, Kansas
1,436	48.20	101.20	Sewage lagoons, Minot, North Dakota
1,346	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
1,261	41.70	93.60	Moeckley Prairie, Polk County, Iowa
1,240	43.00	94.50	Fields near West Bend, Kossuth County, Iowa
1,192	48.10	99.20	Minnewaukan Flats, Benson County, North Dakota
1,155	30.00	92.10	Rice fields in Lafayette Parish and Vermilion Parish, Louisiana
1,065	48.20	101.50	Ward County, North Dakota

Appendix. *Continued.*

Solitary Sandpiper *(Tringa solitaria)*

January through June (Maximum count totals = 5,583)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
2,650	34.70	91.90	Anderson's Fish Hatchery, Lonoke County, Arkansas
1,500	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
1,500	40.70	112.50	Riverdale, Great Salt Lake, Utah
250	36.40	94.30	State Fish Hatchery, Arkansas
230	36.20	94.10	Springdale, Benton County, Arkansas
82	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
70	45.30	97.50	Hawkinson Waterfowl Production Area, near Waubay, South Dakota
66	40.70	95.60	Riverton Wildlife Area, Fremont County, Iowa
46	37.00	90.20	Mingo National Wildlife Refuge, Missouri
31	48.20	101.20	Sewage lagoons, Minot, North Dakota
29	49.90	97.10	Winnipeg, Manitoba
27	36.40	104.40	Maxwell National Wildlife Refuge, New Mexico
23	48.10	100.90	Velva, North Dakota
20	36.70	95.70	Farm ponds, Washington County, Oklahoma
19	42.00	103.50	North Platte National Wildlife Refuge, Nebraska
17	48.60	101.60	Upper Souris National Wildlife Refuge, North Dakota
15	46.50	93.30	Rice Lake National Wildlife Refuge, Minnesota
15	29.60	94.60	Anahuac National Wildlife Refuge, Texas
15	43.70	101.70	Jackson County, South Dakota
14	33.90	96.80	Hagerman National Wildlife Refuge, Texas

July through December (Maximum count totals = 1,991)

Maximum Count	Latitude (°N)	Longitude (W)	Location
202	41.80	91.50	Coralville Reservoir, Johnson County, Iowa
129	43.30	94.10	Union Slough National Wildlife Refuge, Iowa
100	41.50	93.40	South of Runnells, Polk County, Iowa
92	36.20	94.10	Springdale, Benton County, Arkansas
72	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
58	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
52	32.80	97.10	Village Creek Treatment Plant, Texas
45	30.20	97.60	Hornsby Bend Ponds, Texas
35	33.90	96.80	Hagerman National Wildlife Refuge, Texas
31	40.70	95.60	Riverton Wildlife Area, Fremont County, Iowa
30	41.70	91.50	Iowa City, Johnson County, Iowa
28	41.80	93.70	Northeast of Polk City, Polk County, Iowa
27	39.40	91.10	Ted Shanks Wildlife Area, Missouri
26	46.90	96.80	North Dakota State University, Fargo, North Dakota
25	45.40	97.30	Waubay National Wildlife Refuge, South Dakota
23	42.10	93.10	North of Clemons, Marshall County, Iowa
21	41.70	93.60	Polk County, Iowa
20	40.40	99.50	Atlanta Wildlife Production Area, Phelps County, Nebraska
20	34.70	91.90	Anderson's Fish Hatchery, Lonoke County, Arkansas
20	46.50	93.30	Rice Lake National Wildlife Refuge, Minnesota
18	32.70	96.80	Southside Water Treatment Plant, Dallas County, Texas
18	42.00	94.40	Southwestern Greene County, Iowa
17	42.00	103.50	North Platte National Wildlife Refuge, Nebraska
17	41.70	94.30	Bays Branch Wildlife Area, Guthrie County, Iowa
15	36.40	104.40	Maxwell National Wildlife Refuge, New Mexico

Appendix. *Continued.*

Willet *(Catoptrophorus semipalmatus)*

January through June (Maximum count totals = 22,212)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
2,334	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
1,440	29.50	94.60	Bolivar Flats, Texas
1,293	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
1,280	27.40	97.40	Padre Island National Seashore, Texas
1,014	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
932	28.90	95.60	San Bernard National Wildlife Refuge, Texas
881	28.20	96.60	Matagorda National Wildlife Refuge, Texas
760	26.10	97.20	South Padre Island, Texas
664	28.20	96.90	Aransas National Wildlife Refuge, Texas
630	29.60	94.50	Rice fields, Rollover Bay, Chambers County, Texas
500	40.70	112.50	Riverdale, Great Salt Lake, Utah
469	28.90	95.10	San Luis Pass, Galveston Island, Texas
396	26.20	97.20	South Padre Island, Texas
362	41.10	112.00	Layton Marsh, Great Salt Lake, Utah
343	50.30	108.40	Antelope Lake, Saskatchewan
330	33.80	98.40	Lake Arrowhead, Clay County, Texas
307	28.80	95.60	Sargent Island, Texas
284	47.70	111.30	Benton Lake National Wildlife Refuge, Montana
279	27.70	97.20	Mustang Island Beach, Texas
235	33.90	96.80	Hagerman National Wildlife Refuge, Texas
230	29.40	94.60	Shore east of Bolivar Flats, Galveston Island, Texas
219	51.10	107.10	Luck Lake, Saskatchewan
200	45.90	109.10	Halfbreed National Wildlife Refuge, Montana
200	45.80	108.50	Ponds, lakes, rivers, near Billings, Montana
200	38.30	104.60	Pueblo, Colorado
194	41.20	112.00	South shore, Great Salt Lake, Utah
150	38.20	103.80	Ordway, Colorado
143	41.10	112.10	Howard Slough Wildlife Management Area, Great Salt Lake, Utah
140	26.00	97.10	Boca Chica Beach, Cameron County, Texas

July through December (Maximum count totals = 9,092)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
1,250	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
1,040	26.10	97.20	South Padre Island, Texas
792	27.40	97.40	Padre Island National Seashore, Texas
560	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
532	27.80	97.10	Airport, Port Aransas, Texas
462	28.90	95.60	San Bernard National Wildlife Refuge, Texas
350	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
350	29.50	94.60	Bolivar Flats, Texas
299	28.20	96.60	Matagorda National Wildlife Refuge, Texas
297	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
261	28.10	96.90	Aransas County, Texas
250	41.10	112.00	Layton Marsh, Great Salt Lake, Utah
195	51.90	104.10	Quill Lakes, Saskatchewan
175	29.00	95.40	Eagle Lake, Texas
172	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
145	27.70	97.20	Mustang Island Beach, Texas

Appendix. *Continued.*

Spotted Sandpiper *(Actitis macularia)*

January through June (Maximum count totals = 3,463)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
509	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
509	41.10	112.00	Layton Marsh, Great Salt Lake, Utah
265	29.50	94.60	Bolivar Flats, Texas
182	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
84	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
75	46.50	93.30	Rice Lake National Wildlife Refuge, Minnesota
66	32.50	94.70	Longview, Texas
65	32.60	94.40	Harrison County, Texas
63	28.90	95.60	San Bernard National Wildlife Refuge, Texas
60	36.20	95.90	Mohawk Park, Tulsa, Oklahoma
60	40.10	95.30	Big Lake State Park, Missouri
55	48.20	101.20	Sewage lagoons, Minot, North Dakota
52	39.80	113.30	Fish Springs National Wildlife Refuge, Utah
51	48.20	101.50	Minot, North Dakota
50	46.30	96.50	Breckenridge sewage lagoons, Minnesota
50	39.60	102.20	Bonny Reservoir, Colorado
50	33.90	96.80	Hagerman National Wildlife Refuge, Texas
48	47.90	97.40	Grand Forks County, North Dakota
47	38.30	103.70	Lake Henry, Colorado
42	38.40	105.00	Penrose, Colorado
40	46.90	96.80	North Dakota State University, Fargo, North Dakota
40	50.90	106.20	Eyebrow Lake, Saskatchewan

July through December (Maximum count totals = 2,432)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
281	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
90	48.20	101.20	Sewage lagoons, Minot, North Dakota
80	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
75	48.20	101.30	Oak Park, Minot, North Dakota
72	46.10	96.10	Orwell Wildlife Management Area, Minnesota
65	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
65	42.00	103.50	North Platte National Wildlife Refuge, Nebraska
60	40.90	112.10	Farmington Bay, Great Salt Lake, Utah
58	39.80	113.30	Fish Springs National Wildlife Refuge, Utah
50	41.30	112.20	Harold Crane Wildlife Management Area, Great Salt Lake, Utah
44	46.30	96.50	Breckenridge sewage lagoons, Minnesota
40	39.50	105.00	Chatfield, Colorado
40	37.70	118.10	Dyer, Nevada
39	32.80	106.10	Holloman Air Force Base, New Mexico
36	39.90	104.90	Barr Lake State Park, Colorado
35	33.90	96.80	Hagerman National Wildlife Refuge, Texas
31	48.30	100.80	McHenry County, North Dakota
30	36.70	95.60	Oolagah Reservoir, Nowata County, Oklahoma
30	40.70	95.60	Riverton Wildlife Area, Fremont County, Iowa
26	48.00	97.10	Grand Forks Lagoons area, North Dakota
26	47.90	97.40	Grand Forks County, North Dakota
26	36.40	104.40	Maxwell National Wildlife Refuge, New Mexico
25	35.20	111.70	Kachina Village, south of Flagstaff, Arizona

Appendix. *Continued.*

Upland Sandpiper (*Bartramia longicauda*)

January through June (Maximum count totals = 4,610)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
1000	27.80	97.40	Corpus Christi, Texas
400	35.20	97.40	Norman, Cleveland County, Oklahoma
367	29.70	94.60	Chambers County, Texas
250	27.50	97.90	Western Kleberg County, Texas
184	36.40	94.30	State Fish Hatchery, Arkansas
139	48.20	101.50	Minot, North Dakota
125	33.90	96.80	Hagerman National Wildlife Refuge, Texas
120	29.10	97.30	DeWitt County, Texas
100	47.60	101.20	Audubon National Wildlife Refuge, North Dakota
100	41.70	102.50	Crescent Lake National Wildlife Refuge, Nebraska
75	30.00	98.90	Two miles west of Comfort, Kerr County, Texas
70	30.10	97.30	Lake Bastrop, Texas
69	36.20	95.90	Mohawk Park, Tulsa, Oklahoma
56	48.30	100.60	Denbigh, North Dakota
56	36.60	96.30	Osage County, Oklahoma
50	29.80	97.90	Northern Guadalupe County, Texas
49	30.20	97.40	Utley, Bastrop County, Texas
49	47.00	99.80	West of Horsehead Lake, Kidder County, North Dakota
45	46.40	100.80	Solen area, Sioux County, North Dakota
40	35.20	97.30	Cleveland County, Oklahoma
40	28.50	96.60	Magnolia Beach, Indianola Island, Calhoun County, Texas
38	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
35	48.30	100.80	McHenry County, North Dakota

July through December (Maximum count totals = 3,446)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
570	36.00	95.70	Coweta sod farms, Wagoner County, Oklahoma
370	36.10	98.50	Near Southard, Blaine County, Oklahoma
300	33.90	96.80	Hagerman National Wildlife Refuge, Texas
225	35.90	95.90	Arkansas River at Bixby, Tulsa County, Oklahoma
125	47.00	99.80	Casselton, North Dakota
100	48.20	101.50	Ward County, North Dakota
82	47.70	111.30	Benton Lake National Wildlife Refuge, Montana
80	31.90	102.10	Midland, Texas
70	45.10	99.20	Faulk County, South Dakota
62	42.10	102.60	Palmer Lake near Antioch, Sheridan County, Nebraska
56	41.70	102.50	Crescent Lake National Wildlife Refuge, Nebraska
50	35.20	97.50	Duluth, Minnesota
50	36.00	95.60	Wagoner County, Oklahoma
50	48.30	100.80	Sewage lagoons, Minot, North Dakota
48	28.70	97.60	Between Berclair and Runge, Karnes County, Texas
48	46.40	100.80	Solen area, North Dakota
46	46.80	102.70	Southwestern Greene County, Iowa
45	33.40	95.70	Rice fields, Delta County, Texas
40	36.70	95.60	Oolagah Reservoir, Nowata County, Oklahoma
35	40.30	103.80	Southeastern Colorado
35	48.00	98.90	Devil's Lake, North Dakota
32	31.50	106.20	Fabens, El Paso County, Texas

Appendix. *Continued.*

Whimbrel *(Numenius phaeopus)*

January through June (Maximum count totals = 4,409)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
1,224	29.70	94.60	Chambers County, Texas
453	29.60	94.60	Anahuac National Wildlife Refuge, Texas
300	29.90	94.40	North of Winnie, Texas
192	29.90	94.20	Six miles north of Interstate 10, west Jefferson County, Texas
183	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
160	49.80	112.20	Taber area, Alberta
150	50.00	113.00	Keho Lake, Alberta
140	50.10	112.10	Vauxhall, Alberta
90	29.90	92.30	Fields and ponds southwest of Abbeville, Louisiana
85	48.40	107.70	Pond east of Round Prairie, Glacier National Park, Montana
81	28.90	95.60	San Bernard National Wildlife Refuge, Texas
60	29.90	93.20	Rice fields, Cameron County, Louisiana
52	50.20	97.10	Oak Hammock Marsh, Manitoba
51	30.20	92.30	Between Duson and Crowley, Louisiana
50	47.80	90.10	Paradise Beach, Cook County, Minnesota
43	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
41	46.20	108.90	Spidel National Wildlife Refuge, Montana
40	47.80	90.30	Grand Marais, Cook County, Minnesota
40	29.50	94.60	Bolivar Flats, Texas
35	47.80	112.10	Freezeout Lake, Montana
33	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
33	36.70	95.60	Oolagah Reservoir, Nowata County, Oklahoma
32	44.80	107.00	Sheridan, Wyoming

July through December (Maximum count totals = 129)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
23	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
10	45.80	108.90	Border of Stillwater County and Yellowstone County, Montana
9	28.20	96.60	Matagorda National Wildlife Refuge, Texas
7	47.70	111.30	Benton Lake National Wildlife Refuge, Montana
6	45.90	109.20	West of Billings, Montana
5	28.90	96.00	Rice field, Matagorda County, Texas
5	29.50	94.60	Bolivar Flats, Texas
3	41.70	93.60	Moeckley Prairie, Polk County, Iowa
3	33.40	104.50	Bitter Lake National Wildlife Refuge, New Mexico
3	28.30	96.80	Burgentine Lake, Aransas National Wildlife Refuge, Texas
3	39.30	118.70	Carson Lake, Nevada
3	50.70	107.50	Lake Diefenbaker, Saskatchewan
2	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
2	42.80	106.30	Casper, Wyoming
2	29.20	95.80	Big Reef, Galveston Island, Texas
2	29.60	94.50	Rice fields, Chambers County, Texas
2	46.80	92.10	Duluth, Minnesota
2	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
2	26.00	97.20	Port Isabel, South Padre Island, Texas
2	47.80	90.80	Tofte, Cook County, Minnesota
2	36.20	115.20	Southeastern Nevada
2	40.50	104.40	Weld County, Colorado

Appendix. *Continued.*

Long-billed Curlew *(Numenius americanus)*

January through June (Maximum count totals = 5,028)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
1,800	27.80	97.90	Western Nueces County, Texas
268	27.20	98.10	Falfurrias, Texas
246	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
182	28.90	95.60	San Bernard National Wildlife Refuge, Texas
130	41.70	102.50	Crescent Lake National Wildlife Refuge, Nebraska
120	39.50	118.80	Fallon, Nevada
117	42.10	102.60	Palmer Lake near Antioch, Sheridan County, Nebraska
86	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
85	39.50	118.60	Stillwater National Wildlife Refuge, Nevada
77	31.50	106.20	Fabens, El Paso County, Texas
75	39.00	111.60	Central Utah
71	36.60	114.50	Overton, Nevada
53	49.80	112.20	South of Taber, Alberta
52	43.80	102.50	Badlands National Park, Pennington County, South Dakota
51	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
50	34.10	102.90	Bailey County, Texas
50	28.50	96.60	Magnolia Beach, Indianola Island, Calhoun County, Texas
50	50.90	108.20	White Bear, Saskatchewan
46	37.30	102.60	Baca County, Colorado
46	29.10	97.30	DeWitt County, Texas
43	29.50	94.60	Bolivar Flats, Texas
41	27.40	97.40	Padre Island National Seashore, Texas
40	50.50	109.00	Great Sandhills, Saskatchewan
40	58.05	105.00	Hamilton Reservoir, Colorado
40	39.80	113.30	Fish Springs National Wildlife Refuge, Utah

July through December (Maximum count totals = 8,079)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
856	33.60	102.10	Playa, Lubbock County, Texas
825	34.20	102.10	Playas, Hale County, Texas
781	33.50	102.40	Playa, Hockley County, Texas
750	28.00	97.40	East of Sinton, San Patricio County, Texas
500	31.30	103.80	Toyah Lake, Texas
466	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
400	29.30	103.30	Big Bend area, Texas
334	29.00	95.40	Eagle Lake, Texas
325	33.10	101.80	Playa, Lynn County, Texas
240	39.30	118.70	Carson Lake, Nevada
170	42.10	102.50	Box Butte, Sheridan County, Nebraska
165	28.70	96.10	Mad Island Wildlife Management Area, Texas
150	32.00	102.10	Midland, Texas
145	34.40	102.10	Hart, Castro County, Texas
126	27.40	97.40	Padre Island National Seashore, Texas
83	38.10	102.60	Lamar, Colorado
75	45.90	109.20	West of Billings, Montana
73	47.70	111.30	Benton Lake National Wildlife Refuge, Montana
71	33.40	104.50	Bitter Lake National Wildlife Refuge, New Mexico
70	38.20	112.90	Minersville, Utah

Appendix. *Continued.*

Hudsonian Godwit *(Limosa haemastica)*

January through June (Maximum count totals = 17,159)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
6,850	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
713	44.30	97.40	Lake Thompson, South Dakota
692	44.40	97.50	Kingsbury County, South Dakota
660	28.90	96.60	Jackson County, Texas
423	48.10	99.20	Minnewaukan Flats, Devil's Lake, North Dakota
420	48.20	101.20	Sewage lagoons, Minot, North Dakota
360	45.40	99.20	Edmunds County, South Dakota
327	28.50	96.60	Magnolia Beach, Indianola Island, Calhoun County, Texas
310	40.10	95.30	Big Lake State Park, Missouri
305	51.10	107.10	Luck Lake, Saskatchewan
300	45.00	96.20	Lac qui Parle County, Minnesota
291	48.80	95.80	Roseau County, Minnesota
229	29.90	95.90	Rice fields in Harris County and Waller County, Texas
200	50.20	97.10	Oak Hammock Marsh, Manitoba
159	40.70	95.60	Riverton Wildlife Area, Fremont County, Iowa
150	28.60	96.50	Magnolia Beach, Indianola Island, Calhoun County, Texas
150	29.80	94.40	Rice fields west of Winnie, Texas
150	35.50	97.70	Canadian County, Oklahoma
144	42.00	94.40	Southwest Greene County, Iowa
125	50.90	106.20	Eyebrow Lake, Saskatchewan
102	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
100	43.70	96.80	Minnehaha County, South Dakota
100	44.40	95.30	Redwood County, Minnesota
98	42.10	93.10	North of Clemons, Marshall County, Iowa
85	45.00	97.60	Wetland (KCorn), Clark County, South Dakota
84	48.30	100.60	Denbigh, North Dakota
84	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
82	50.50	104.60	Regina, Saskatchewan
80	45.90	96.00	Grant County, Minnesota
78	29.70	94.60	Chambers County, Texas

July through December (Maximum count totals = 9,358)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
4,000	51.10	107.10	Luck Lake, Saskatchewan
2,934	51.90	104.10	Quill Lakes, Saskatchewan
1,150	52.20	106.30	Porter Lake, Saskatchewan
437	52.10	106.60	Saskatoon, Saskatchewan
250	50.40	106.60	Chaplin Lakes, Saskatchewan
211	51.10	105.20	Last Mountain Lake, Saskatchewan
75	50.90	106.20	Eyebrow Lake, Saskatchewan
51	33.40	104.50	Bitter Lake National Wildlife Refuge, New Mexico
50	48.60	100.30	Willow City, North Dakota
31	48.00	97.10	Grand Forks Lagoons area, North Dakota
29	49.10	99.00	Clearwater, Manitoba
27	44.90	95.60	Wegdahl, Chippewa County, Minnesota
27	53.30	112.50	Beaverhill Lake, Alberta
14	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
9	47.90	97.00	Eastern North Dakota

Appendix. *Continued.*

Marbled Godwit (*Limosa fedoa*)

January through June (Maximum count totals = 55,286)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
35,818	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
26,858	41.50	112.20	Bear River National Wildlife Refuge, Great Salt Lake, Utah
5,000	40.70	112.50	Riverdale, Great Salt Lake, Utah
3,276	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
2,000	41.20	112.50	Great Salt Lake, Utah
1,200	40.80	111.90	Salt Lake City, Utah
1,200	51.90	104.10	Quill Lakes, Saskatchewan
1,000	50.80	112.50	Bassano, Alberta
910	41.30	112.20	Harold Crane Wildlife Management Area, Great Salt Lake, Utah
800	28.00	97.10	Rockport area, Texas
795	51.10	107.10	Luck Lake, Saskatchewan
750	41.10	112.00	Layton Marsh, Great Salt Lake, Utah
695	29.50	94.60	Bolivar Flats, Texas
670	47.00	99.80	West of Horsehead Lake, Kidder County, North Dakota
488	41.10	112.10	Howard Slough Wildlife Management Area, Great Salt Lake, Utah
451	39.50	119.00	Western Nevada
430	50.20	112.30	Lost Lake, Alberta
400	47.10	99.80	Two miles east of Cherry Lake, Kidder County, North Dakota
400	28.50	96.60	Magnolia Beach, Indianola Island, Calhoun County, Texas
325	47.70	111.30	Benton Lake National Wildlife Refuge, Montana
292	28.20	96.90	Aransas National Wildlife Refuge, Texas
240	40.40	104.10	Jackson Reservoir, Morgan County, Colorado
222	40.70	111.90	North Davis Sewage, Utah
212	41.10	112.20	Antelope Island Causeway, Antelope Island, Utah
200	39.10	108.60	Grand Junction, Colorado
200	45.30	97.30	Bitter Lake, South Dakota
168	28.90	96.00	Rice field, Matagorda County, Texas
164	41.20	112.30	Ogden area, Great Salt Lake, Utah

July through December (Maximum count totals = 58,686)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
35,600	41.50	112.20	Bear River National Wildlife Refuge, Great Salt Lake, Utah
30,113	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
12,225	51.10	107.10	Luck Lake, Saskatchewan
1,125	51.10	105.20	Last Mountain Lake, Saskatchewan
1,120	51.90	104.10	Quill Lakes, Saskatchewan
1,025	47.70	111.30	Benton Lake National Wildlife Refuge, Montana
1,000	50.50	106.00	Pelican Lake, Saskatchewan
730	28.00	97.10	Rockport area, Texas
463	41.30	112.20	Harold Crane Wildlife Management Area, Great Salt Lake, Utah
300	39.50	118.60	Stillwater National Wildlife Refuge, Nevada
300	49.90	105.40	Spring Valley, Saskatchewan
250	47.20	98.90	Arrowwood National Wildlife Refuge, North Dakota
250	48.00	108.20	Veseth Reservoir, Phillips County, Montana
200	47.20	98.70	Arrowwood National Wildlife Refuge, North Dakota
190	28.10	96.90	Aransas County, Texas
175	41.30	112.10	West Warren, Great Salt Lake, Utah
165	29.60	90.50	Lafourche Parish, Louisiana
160	45.30	97.60	Day County, South Dakota

Appendix. *Continued.*

Ruddy Turnstone (*Arenaria interpres*)

January through June (Maximum count totals = 20,969)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
10,000	58.70	94.10	Churchill area, Manitoba
2,500	51.10	105.20	Last Mountain Lake, Saskatchewan
1,018	27.40	97.40	Padre Island National Seashore, Texas
974	28.20	96.60	Matagorda National Wildlife Refuge, Texas
780	48.00	98.90	Sewage ponds, Devil's Lake, North Dakota
525	29.40	94.60	Shore east of Bolivar Flats, Galveston Island, Texas
333	27.70	97.20	Mustang Island Beach, Texas
312	52.50	105.00	Lac Lenore, Saskatchewan
261	29.70	94.60	Chambers County, Texas
256	29.60	94.60	Anahuac National Wildlife Refuge, Texas
230	26.00	97.10	Boca Chica Beach, Cameron County, Texas
219	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
200	53.30	112.50	Beaverhill Lake, Alberta
200	54.20	110.70	Muriel Lake, Alberta
200	50.20	97.10	Oak Hammock Marsh, Manitoba
184	29.50	94.60	Bolivar Flats, Texas
156	29.10	90.20	Fourchon Beach, Louisiana
153	26.20	97.20	South Padre Island, Texas
150	29.90	94.20	Six miles north of Interstate 10, west Jefferson County, Texas
144	51.90	104.10	Quill Lakes, Saskatchewan
123	28.80	95.60	Sargent Island, Texas

July through December (Maximum count totals = 2,129)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
471	27.40	97.40	64 Mile Beach, Padre Island National Seashore, Texas
350	47.70	111.30	Benton Lake National Wildlife Refuge, Montana
135	29.00	95.40	Eagle Lake, Texas
130	26.00	97.10	Boca Chica Beach, Cameron County, Texas
105	28.20	96.60	Matagorda National Wildlife Refuge, Texas
100	29.20	95.80	Big Reef, Galveston Island, Texas
92	27.70	97.20	Mustang Island Beach, Texas
78	29.50	94.60	Bolivar Flats, Texas
66	26.00	97.20	Boca Chica Beach, Cameron County, Texas
55	28.10	96.90	Aransas County, Texas
50	29.90	94.20	Jefferson County, Texas
31	28.00	97.10	Rockport area, Texas
30	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
28	28.20	96.90	Aransas National Wildlife Refuge, Texas
23	28.70	96.10	Mad Island Wildlife Management Area, Texas
22	39.50	118.60	Stillwater National Wildlife Refuge, Nevada
20	49.80	112.20	Taber area, Alberta
19	46.30	96.50	Breckenridge sewage lagoons, Minnesota
18	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
16	28.50	96.60	Magnolia Beach, Indianola Island, Calhoun County, Texas
13	26.10	97.20	South Padre Island, Texas
13	41.90	93.20	Hendrickson Marsh, Story County, Iowa
12	39.30	118.70	Carson Lake, Nevada
11	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas

Appendix. *Continued.*

Red Knot *(Calidris canutus)*

January through June (Maximum count totals = 18,927)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
2,838	27.70	97.20	Mustang Island Beach, Texas
2,500	51	105.20	Last Mountain Lake, Saskatchewan
2,500	29.30	89.90	Grand Terre, Jefferson Parish, Louisiana
2,460	27.80	97.10	Airport, Port Aransas, Texas
1,699	51.90	104.10	Quill Lakes, Saskatchewan
1,500	50.40	106.60	Chaplin Lakes, Saskatchewan
1,040	53.30	112.50	Beaverhill Lake, Alberta
900	26.00	97.10	Boca Chica Beach, Cameron County, Texas
800	28.20	96.60	Matagorda National Wildlife Refuge, Texas
750	29.50	94.60	Bolivar Flats, Texas
575	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
267	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
184	27.40	97.40	Padre Island National Seashore, Texas
112	40.90	112.10	Farmington Bay, Great Salt Lake, Utah
90	33.40	104.50	Bitter Lake National Wildlife Refuge, New Mexico
81	26.20	97.20	South Padre Island, Texas
55	28.50	96.60	Magnolia Beach, Indianola Island, Calhoun County, Texas
50	50.90	106.20	Eyebrow Lake, Saskatchewan
48	27.60	97.30	Laguna Madre, Corpus Christi, Texas
48	28.90	95.10	San Luis Pass, Galveston Island, Texas
40	29.20	95.80	Big Reef, Galveston Island, Texas
40	40.70	111.90	North Davis Sewage, Utah
40	29.40	94.60	Shore east of Bolivar Flats, Galveston Island, Texas
38	40.20	105.10	Longmont, Colorado

July through December (Maximum count totals = 4,230)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
1,443	27.70	97.20	Mustang Island Beach, Texas
1,439	27.40	97.40	Padre Island National Seashore, Texas
280	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
250	28.20	96.60	Matagorda National Wildlife Refuge, Texas
182	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
111	27.60	97.80	Beach on border of Nueces County and Kleberg County, Texas
88	27.80	97.10	Airport, Port Aransas, Texas
45	29.50	94.60	Bolivar Flats, Texas
45	36.70	95.60	Oolagah Reservoir, Nowata County, Oklahoma
30	26.10	97.20	South Padre Island, Texas
29	28.30	96.80	Burgentine Lake, Aransas National Wildlife Refuge, Texas
28	26.00	97.10	Boca Chica Beach, Cameron County, Texas
27	27.60	97.30	Laguna Madre, Corpus Christi, Texas
22	35.90	95.90	Arkansas River at Bixby, Tulsa County, Oklahoma
16	51.10	105.20	Last Mountain Lake, Saskatchewan
12	27.70	97.60	Nueces County, Texas
10	29.20	95.80	Big Reef, Galveston Island, Texas
10	33.70	94.00	Lake Millwood, Arkansas

Appendix. *Continued.*

Sanderling (*Calidris alba*)

January through June (Maximum count totals = 130,436)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
23,498	51.90	104.10	Quill Lakes, Saskatchewan
20,000	52.70	110.00	Reflex Lakes, Alberta
13,944	50.40	106.60	Chaplin Lakes, Saskatchewan
11,293	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
10,000	51.10	105.20	Last Mountain Lake, Saskatchewan
10,000	52.80	107.00	Blaine Lakes, Saskatchewan
7,000	41.20	112.00	South shore, Great Salt Lake, Utah
5,586	41.00	112.20	Antelope Island, Great Salt Lake, Utah
4,900	48.90	104.10	Flat Lake, Medicine Lake National Wildlife Refuge, Montana
3,955	27.40	97.40	Padre Island National Seashore, Texas
3,795	28.20	96.60	Matagorda National Wildlife Refuge, Texas
3,000	52.10	110.50	Sounding Lakes, Alberta
2,740	41.10	112.00	Layton Marsh, Great Salt Lake, Utah
1,766	41.10	112.20	Antelope Island Causeway, Antelope Island, Utah
1,541	50.10	106.00	Old Wives Lake, Saskatchewan
1,500	50.00	105.80	Lake Frederick, Saskatchewan
1,485	26.20	97.20	South Padre Island, Texas
1,279	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
1,196	26.00	97.10	Boca Chica Beach, Cameron County, Texas
1,090	27.70	97.20	Mustang Island Beach, Texas

July through December (Maximum count totals = 22,453)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
7,200	51.90	104.10	Quill Lakes, Saskatchewan
4,200	27.40	97.40	Padre Island National Seashore, Texas
1,500	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
900	28.20	96.60	Matagorda National Wildlife Refuge, Texas
873	27.70	97.20	Mustang Island Beach, Texas
730	42.00	103.50	North Platte National Wildlife Refuge, Nebraska
599	26.00	97.10	Boca Chica Beach, Cameron County, Texas
522	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
409	26.00	97.20	Port Isabel, South Padre Island, Texas
370	29.20	95.80	Big Reef, Galveston Island, Texas
350	29.50	94.60	Bolivar Flats, Texas
277	29.00	95.40	Eagle Lake, Texas
220	28.70	96.10	Mad Island Wildlife Management Area, Texas
200	40.50	118.50	Humboldt Wildlife Management Area, Nevada
200	28.50	96.60	Magnolia Beach, Indianola Island, Calhoun County, Texas
192	46.10	96.10	Orwell Wildlife Management Area, Minnesota
176	31.50	92.30	Catahoula Lake, Louisiana
150	48.00	97.10	Grand Forks Lagoons area, North Dakota
146	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
141	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
141	41.10	112.20	Antelope Island Causeway, Antelope Island, Utah
104	47.20	98.90	Arrowwood National Wildlife Refuge, North Dakota

Appendix. *Continued.*

Semipalmated Sandpiper *(Calidris pusilla)*

January through June (Maximum count totals = 260,709)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
>60,000	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
15,000	48.10	99.20	Minnewaukan Flats, Devil's Lake, North Dakota
12,970	51.90	104.10	Quill Lakes, Saskatchewan
9,668	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
9,218	44.70	97.00	Dry Lake B, Clark County, South Dakota
7,987	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
6,000	47.50	100.80	Blue Lake, North Dakota
5,997	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
4,415	48.00	98.90	Sewage ponds, Devil's Lake, North Dakota
4,022	29.90	95.90	Rice fields in Harris County and Waller County, Texas
4,000	40.70	95.60	Riverton Wildlife Area, Fremont County, Iowa
4,000	51.10	107.10	Luck Lake, Saskatchewan
3,590	50.40	106.60	Chaplin Lakes, Saskatchewan
3,400	48.20	101.20	Sewage lagoons, Minot, North Dakota
3,331	38.20	98.60	Quivira National Wildlife Refuge, Kansas
3,015	30.20	92.30	Between Duson and Crowley, Louisiana
2,759	44.70	97.60	Dry Lake A, Clark County, South Dakota
2,650	34.80	92.00	Lonoke County, Arkansas
2,110	44.00	96.90	Milwaukee Lake, South Dakota
2,069	26.20	97.20	South Padre Island, Texas
2,000	47.60	101.20	Audubon National Wildlife Refuge, North Dakota
2,000	29.50	94.60	Bolivar Flats, Texas
1,800	47.60	101.00	Lake Nettie National Wildlife Refuge, North Dakota

July through December (Maximum count totals = 91,453)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
43,250	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
7,000	48.10	99.20	Minnewaukan Flats, Devil's Lake, North Dakota
3,615	51.90	104.10	Quill Lakes, Saskatchewan
3,000	47.90	100.20	Border of McHenry County and Wells County, North Dakota
2,753	31.50	92.30	Catahoula Lake, Louisiana
2,025	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
2,015	51.10	107.10	Luck Lake, Saskatchewan
1,890	28.90	95.60	San Bernard National Wildlife Refuge, Texas
1,651	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
1,500	46.90	96.80	North Dakota State University, Fargo, North Dakota
1,460	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
1,200	48.00	98.90	Devil's Lake, North Dakota
1,005	51.10	105.20	Last Mountain Lake, Saskatchewan
1,000	48.00	97.10	Grand Forks Lagoons area, North Dakota
850	30.20	92.30	Between Duson and Crowley, Louisiana
705	46.90	97.20	Casselton, North Dakota
700	48.20	101.20	Sewage lagoons, Minot, North Dakota
602	38.20	98.60	Quivira National Wildlife Refuge, Kansas
600	46.10	96.10	Orwell Wildlife Management Area, Minnesota
600	47.90	97.40	Grand Forks County, North Dakota
600	28.30	96.80	Burgentine Lake, Aransas National Wildlife Refuge, Texas

Appendix. *Continued.*

Western Sandpiper *(Calidris mauri)*

January through June (Maximum count totals = 116,902)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
21,311	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
10,000	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
9,198	29.50	94.60	Bolivar Flats, Texas
8,000	29.30	89.90	Grand Terre, Jefferson Parish, Louisiana
7,976	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
7,916	26.20	97.20	South Padre Island, Texas
7,750	28.90	95.60	San Bernard National Wildlife Refuge, Texas
7,500	41.10	112.00	Layton Marsh, Great Salt Lake, Utah
5,185	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
5,000	28.70	96.10	Mad Island Wildlife Management Area, Texas
4,445	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
3,130	30.20	92.30	Between Duson and Crowley, Louisiana
2,527	30.20	92.70	Between Jennings and Welsh, Louisiana
2,374	28.20	96.60	Matagorda National Wildlife Refuge, Texas
2,003	33.40	104.50	Bitter Lake National Wildlife Refuge, New Mexico
2,000	30.10	92.90	Between Lake Arthur and Holmwood, Louisiana
1,440	41.00	111.90	West of Interpretive Center, Great Salt Lake, Utah
1,270	28.90	95.10	San Luis Pass, Galveston Island, Texas
1,035	28.10	97.10	Near Aransas National Wildlife Refuge including Copano Bay, Texas
939	28.20	96.90	Aransas National Wildlife Refuge, Texas

July through December (Maximum count totals = 138,010)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
21,500	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
20,000	39.30	118.70	Carson Lake, Nevada
10,530	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
10,500	41.30	112.20	Harold Crane Wildlife Management Area, Great Salt Lake, Utah
9,160	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
6,217	41.50	112.20	Bear River National Wildlife Refuge, Great Salt Lake, Utah
5,000	27.70	97.30	Oso Bay, Texas
5,000	29.50	94.60	Bolivar Flats, Texas
4,240	30.20	92.30	Between Duson and Crowley, Louisiana
4,120	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
4,100	28.70	96.10	Mad Island Wildlife Management Area, Texas
4,000	31.50	92.30	Catahoula Lake, Louisiana
3,900	40.50	118.50	Humboldt Wildlife Management Area, Nevada
3,700	41.10	112.00	North Layton, Utah
3,000	28.50	96.50	Calhoun County, Texas
2,801	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
2,375	28.90	95.60	San Bernard National Wildlife Refuge, Texas
2,300	28.80	95.80	Big Boggy, Texas
2,200	41.70	112.60	Promontory, Great Salt Lake, Utah
1,883	39.80	113.30	Fish Springs National Wildlife Refuge, Utah
1,575	41.70	112.90	Locomotive Springs, Great Salt Lake, Utah
1,500	29.70	94.80	Trinity Bay, Texas
1,224	41.00	111.90	West of Interpretive Center, Great Salt Lake, Utah
1,150	40.90	112.10	Farmington Bay, Great Salt Lake, Utah
1,050	34.70	91.90	Anderson's Fish Hatchery, Lonoke County, Arkansas
1,000	33.90	96.80	Hagerman National Wildlife Refuge, Texas

Appendix. *Continued.*

Least Sandpiper (*Calidris minutilla*)

January through June (Maximum count totals = 77,352)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
25,166	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
13,833	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
7,149	51.90	104.10	Quill Lakes, Saskatchewan
3,508	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
3,063	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
1,650	41.10	112.00	Layton Marsh, Great Salt Lake, Utah
1,115	28.90	95.60	San Bernard National Wildlife Refuge, Texas
1,070	30.20	92.30	Between Duson and Crowley, Louisiana
1,000	29.30	89.90	Grand Terre, Jefferson Parish, Louisiana
1,000	51.60	104.70	Kutawagon Lakes, Saskatchewan
1,000	34.80	92.00	Lonoke County, Arkansas
994	44.70	97.00	Dry Lake B, Clark County, South Dakota
875	30.00	93.10	Cameron Parish, Louisiana
800	46.00	97.40	Tewaukon National Wildlife Refuge, North Dakota
781	29.50	94.60	Bolivar Flats, Texas
550	48.20	101.20	Sewage lagoons, Minot, North Dakota
534	44.70	97.70	Pond near Dry Lake, Clark County, South Dakota
532	28.20	96.60	Matagorda National Wildlife Refuge, Texas
510	29.60	94.50	Rice fields, Rollover Bay, Chambers County, Texas
508	33.40	104.50	Bitter Lake National Wildlife Refuge, New Mexico
500	32.80	97.10	Village Creek Treatment Plant, Texas
400	48.10	99.20	Minnewaukan Flats, Devil's Lake, North Dakota
380	48.30	100.80	McHenry County, North Dakota
375	48.20	101.00	Border of McHenry County and Ward County, North Dakota
370	28.80	95.90	Matagorda County, Texas
350	43.30	94.10	Union Slough National Wildlife Refuge, Iowa
342	39.80	113.30	Fish Springs National Wildlife Refuge, Utah
341	27.80	97.10	Airport, Port Aransas, Texas

July through December (Maximum count totals = 206,238)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
>60,000	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
8,800	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
2,200	51.90	104.10	Quill Lakes, Saskatchewan
2,000	29.30	98.50	Mitchell Lake, Bexar County, Texas
2,000	43.30	94.10	Union Slough National Wildlife Refuge, Iowa
1,400	31.50	92.30	Catahoula Lake, Louisiana
1,322	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
1,295	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
1,181	30.20	92.30	Between Duson and Crowley, Louisiana
1,000	46.10	96.10	Orwell Wildlife Management Area, Minnesota
800	32.20	110.90	Tucson, Arizona
709	30.10	92.90	Between Lake Arthur and Holmwood, Louisiana
700	32.30	111.00	Sewage treatment plant, Tucson, Arizona
675	39.40	119.10	Lahontan Valley, Nevada
650	34.00	102.70	Muleshoe National Wildlife Refuge, Texas
635	28.90	95.60	San Bernard National Wildlife Refuge, Texas
619	28.70	96.10	Mad Island Wildlife Management Area, Texas

Appendix. *Continued.*

White-rumped Sandpiper *(Calidris fuscicollis)*

January through June (Maximum count totals = 343,257)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
>60,000	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
30,000	48.10	99.20	Minnewaukan Flats, Devil's Lake, North Dakota
17,126	51.90	104.10	Quill Lakes, Saskatchewan
12,519	44.70	97.00	Dry Lake B, Clark County, South Dakota
7,660	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
6,349	44.70	97.60	Dry Lake A, Clark County, South Dakota
5,600	47.70	100.20	Sheyenne Lake, North Dakota
4,864	38.20	98.60	Quivira National Wildlife Refuge, Kansas
4,170	44.00	96.90	Milwaukee Lake, South Dakota
4,000	47.50	100.80	Blue Lake, North Dakota
3,800	42.90	97.00	Clay County, South Dakota
3,800	44.00	97.10	Lake County, South Dakota
3,500	48.20	101.20	Sewage lagoons, Minot, North Dakota
3,500	46.80	100.40	McKenzie Slough, North Dakota
3,500	48.60	102.40	Lostwood National Wildlife Refuge, North Dakota
2,945	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
2,525	48.00	98.90	Devil's Lake, North Dakota
2,000	47.50	101.00	Turtle Lake, North Dakota
2,000	40.70	95.60	Riverton Wildlife Area, Fremont County, Iowa
2,000	47.60	101.20	Audubon National Wildlife Refuge, North Dakota
2,000	48.80	102.10	Des Lacs Valley, North Dakota
1,905	44.30	97.40	Lake Thompson, South Dakota
1,890	45.00	97.60	Wetland (KCorn), Clark County, South Dakota
1,675	51.10	107.10	Luck Lake, Saskatchewan
1,612	44.70	97.70	Pond near Dry Lake, Clark County, South Dakota
1,450	48.00	100.60	Connia Slough, McHenry County, North Dakota
1,372	44.30	97.50	Lake Thompson, South Dakota
1,000	47.60	101.30	McLean County, North Dakota
1,000	29.10	97.50	Cameron County, Texas
970	30.20	92.30	Between Duson and Crowley, Louisiana

July through December (Maximum count totals = 4,600)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
3,000	58.70	94.10	Churchill, Manitoba
1,000	51.90	104.10	Quill Lakes, Saskatchewan
160	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
95	33.70	94.00	Lake Millwood, Arkansas
32	46.30	96.50	Breckenridge sewage lagoons, Minnesota
25	35.40	95.00	R. S. Kerr Lake, Oklahoma
23	46.10	96.10	Orwell Wildlife Management Area, Minnesota
18	38.20	98.60	Quivira National Wildlife Refuge, Kansas
12	45.60	98.30	Brown County, South Dakota
12	29.30	98.50	Mitchell Lake, Bexar County, Texas
11	39.00	92.60	Overton Bottoms, Missouri
11	36.10	96.00	Lynn Lane Reservoir, Tulsa County, Oklahoma
10	45.90	109.20	West of Billings, Montana
10	36.20	94.10	Springdale, Benton County, Arkansas

Appendix. *Continued.*

Baird's Sandpiper (*Calidris bairdii*)

January through June (Maximum count totals = 142,864)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
>60,000	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
16,733	50.40	106.60	Chaplin Lakes, Saskatchewan
10,000	52.40	110.60	Metiskow Lake, Alberta
4,150	51.90	104.10	Quill Lakes, Saskatchewan
2,952	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
2,200	44.00	97.10	Lake County, South Dakota
1,731	44.30	97.40	Lake Thompson, South Dakota
1,677	44.00	96.90	Milwaukee Lake, South Dakota
1,500	47.50	100.80	Blue Lake, North Dakota
1,337	38.20	98.60	Quivira National Wildlife Refuge, Kansas
1,210	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
1,000	29.10	97.50	Cameron County, Texas
800	48.20	101.20	Sewage lagoons, Minot, North Dakota
800	33.90	96.80	Hagerman National Wildlife Refuge, Texas
525	48.20	101.50	Minot, North Dakota
500	35.50	97.70	Lake Overholser, Oklahoma County, Oklahoma
500	48.80	102.10	Des Lacs Valley, North Dakota
470	48.60	100.70	J. C. Salyer National Wildlife Refuge, North Dakota
450	39.30	98.50	Wilson State Park and Wildlife Area, Kansas
450	29.30	98.50	Mitchell Lake, Bexar County, Texas

July through December (Maximum count totals = 60,019)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
31,110	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
5,000	41.20	101.70	Lake McConaughy, Nebraska
3,700	51.90	104.10	Quill Lakes, Saskatchewan
2,400	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
1,500	48.30	100.60	Denbigh, North Dakota
1,100	40.30	103.80	Southeastern Colorado
1,100	39.90	104.90	Barr Lake State Park, Colorado
750	34.00	102.70	Muleshoe National Wildlife Refuge, Texas
691	42.30	102.20	Sandhills, Sheridan County, Nebraska
613	39.80	104.90	Denver, Colorado
500	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
500	42.50	102.40	Western Nevada
500	41.50	112.20	Bear River National Wildlife Refuge, Great Salt Lake, Utah
490	48.20	101.20	Sewage lagoons, Minot, North Dakota
453	38.20	98.60	Quivira National Wildlife Refuge, Kansas
445	40.40	104.10	Jackson Reservoir, Morgan County, Colorado
400	48.00	97.10	North of Grand Forks Lagoons, North Dakota
380	33.40	104.50	Bitter Lake National Wildlife Refuge, New Mexico
365	51.10	107.10	19 km west of Luck Lake, Saskatchewan
350	47.70	111.30	Benton Lake National Wildlife Refuge, Montana
350	38.00	103.50	Northeastern Colorado
300	46.90	96.80	North Dakota State University, Fargo, North Dakota
300	40.60	105.10	Fort Collins, Colorado
275	42.70	103.40	Crawford, Dawes County, Nebraska
255	42.10	102.50	Box Butte, Sheridan County, Nebraska

Appendix. *Continued.*

Pectoral Sandpiper *(Calidris melanotos)*

January through June (Maximum count totals = 55,205)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
18,700	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
3,018	44.70	97.00	Dry Lake B, Clark County, South Dakota
1,928	29.90	95.90	Rice fields, Harris County and Waller County, Texas
1,500	41.80	91.50	Coralville Reservoir, Johnson County, Iowa
1,500	29.30	89.90	Grand Terre, Jefferson Parish, Louisiana
1,500	40.70	95.60	Riverton Wildlife Area, Fremont County, Iowa
1,087	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
1,000	27.80	97.40	Corpus Christi, Texas
1,000	39.40	91.10	Ted Shanks Wildlife Area, Missouri
1,000	44.40	95.30	Redwood County, Minnesota
1,000	53.30	112.50	Beaverhill Lake, Alberta
1,000	34.70	91.90	Anderson's Fish Hatchery, Lonoke County, Arkansas
858	29.70	94.60	Chambers County, Texas
833	44.70	97.70	Pond near Dry Lake, Clark County, South Dakota
800	48.20	101.20	Sewage lagoons, Minot, North Dakota
750	48.10	99.20	Minnewaukan Flats, Devil's Lake, North Dakota
735	30.20	92.30	Between Duson and Crowley, Louisiana
700	43.30	94.10	Union Slough National Wildlife Refuge, Iowa
600	44.00	97.10	Lake County, South Dakota
574	41.80	93.70	Northeast of Polk City, Polk County, Iowa
560	42.00	94.40	Southwestern Greene County, Iowa
550	28.80	97.00	Victoria County, Texas
500	36.70	95.60	Oolagah Reservoir, Nowata County, Oklahoma
500	35.90	95.90	Arkansas River at Bixby, Tulsa County, Oklahoma

July through December (Maximum count totals = 83,842)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
28,811	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
6,200	51.90	104.10	Quill Lakes, Saskatchewan
5,086	43.30	94.10	Union Slough National Wildlife Refuge, Iowa
3,800	46.90	96.80	North Dakota State University, Fargo, North Dakota
3,000	41.80	91.50	Coralville Reservoir, Johnson County, Iowa
2,500	48.00	98.90	Devil's Lake, North Dakota
2,017	31.50	92.30	Catahoula Lake, Louisiana
2,000	50.20	97.10	Oak Hammock Marsh, Manitoba
2,000	47.20	98.90	Arrowwood National Wildlife Refuge, North Dakota
1,781	41.70	93.60	Moeckley Prairie, Polk County, Iowa
1,600	43.00	94.50	Fields near West Bend, Kossuth County, Iowa
1,500	41.50	93.40	South of Runnells, Polk County, Iowa
1,320	51.10	107.10	19 km west of Luck Lake, Saskatchewan
1,000	41.80	93.70	Northeast of Polk City, Polk County, Iowa
947	46.90	97.20	Casselton, North Dakota
805	30.10	92.90	Between Lake Arthur and Holmwood, Louisiana
750	36.00	95.70	Coweta sod farms, Wagoner County, Oklahoma
700	48.00	97.10	North of Grand Forks Lagoons, North Dakota
601	30.20	92.30	Between Duson and Crowley, Louisiana
570	41.70	94.30	Bays Branch Wildlife Area, Guthrie County, Iowa
550	48.20	101.20	Sewage lagoons, Minot, North Dakota

Appendix. *Continued.*

Dunlin (*Calidris alpina*)

January through June (Maximum count totals = 91,867)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
25,000	48.10	99.20	Minnewaukan Flats, Devil's Lake, North Dakota
9,087	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
8,000	29.30	89.90	Grand Terre, Jefferson Parish, Louisiana
5,242	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
4,040	29.50	94.60	Bolivar Flats, Texas
3,710	30.20	92.30	Between Duson and Crowley, Louisiana
3,495	28.90	95.60	San Bernard National Wildlife Refuge, Texas
2,768	27.80	97.10	Airport, Port Aransas, Texas
2,547	26.20	97.20	South Padre Island, Texas
2,014	28.20	96.60	Matagorda National Wildlife Refuge, Texas
2,000	29.90	95.90	Rice fields, Harris County and Waller County, Texas
1,575	28.90	95.10	San Luis Pass, Galveston Island, Texas
1,517	33.40	104.50	Bitter Lake National Wildlife Refuge, New Mexico
1,452	48.00	98.90	Devil's Lake, North Dakota
1,400	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
1,375	28.80	95.90	Matagorda County, Texas
1,368	44.70	97.00	Dry Lake B, Clark County, South Dakota
1,134	29.70	94.60	Chambers County, Texas
866	44.00	96.90	Milwaukee Lake, South Dakota
860	30.10	92.90	Between Lake Arthur and Holmwood, Louisiana
820	28.70	96.10	Mad Island Wildlife Management Area, Texas
790	30.20	92.70	Between Jennings and Welsh, Louisiana
754	44.00	97.10	Lake County, South Dakota
663	29.60	94.60	Anahuac National Wildlife Refuge, Texas
531	29.60	94.50	Rice fields, Rollover Bay, Chambers County, Texas

July through December (Maximum count totals = 18,182)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
2,743	28.70	96.10	Mad Island Wildlife Management Area, Texas
2,500	29.70	94.80	Trinity Bay, Texas
2,385	30.20	92.30	Between Duson and Crowley, Louisiana
1,556	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
1,550	28.00	97.10	Rockport area, Texas
900	29.50	94.60	Bolivar Flats, Texas
886	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
735	27.80	97.10	Airport, Port Aransas, Texas
518	33.40	104.50	Bitter Lake National Wildlife Refuge, New Mexico
415	29.00	95.40	Eagle Lake, Texas
350	30.10	92.90	Between Lake Arthur and Holmwood, Louisiana
350	28.30	96.80	Burgentine Lake, Aransas National Wildlife Refuge, Texas
346	28.20	96.60	Matagorda National Wildlife Refuge, Texas
300	48.40	97.70	Walsh County, North Dakota
200	39.30	118.70	Carson Lake, Nevada
200	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
141	26.10	97.20	South Padre Island, Texas
135	48.10	99.20	Minnewaukan Flats, Devil's Lake, North Dakota
125	29.20	95.80	Big Reef, Galveston Island, Texas
120	39.40	119.10	Lahontan Valley, Nevada

Appendix. *Continued.*

Stilt Sandpiper *(Calidris himantopus)*

January through June (Maximum count totals = 149,297)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
54,900	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
14,488	51.90	104.10	Quill Lakes, Saskatchewan
10,000	52.40	110.20	Gillespie Lake area, Alberta
10,000	48.10	99.20	Minnewaukan Flats, Devil's Lake, North Dakota
5,082	50.50	106.00	Pelican Lake, Saskatchewan
4,888	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
3,080	28.90	95.60	San Bernard National Wildlife Refuge, Texas
2,725	53.30	112.50	Beaverhill Lake, Alberta
2,640	30.20	92.30	Between Duson and Crowley, Louisiana
2,500	50.80	104.90	Valeport Marsh, Saskatchewan
2,450	51.10	105.20	Last Mountain Lake, Saskatchewan
1,756	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
1,592	48.60	100.70	J. C. Salyer National Wildlife Refuge, North Dakota
1,500	48.20	101.30	Oak Park, Minot, North Dakota
1,481	44.70	97.00	Dry Lake B, Clark County, South Dakota
1,433	28.20	96.60	Matagorda National Wildlife Refuge, Texas
1,430	51.10	107.10	Luck Lake, Saskatchewan
1,300	48.20	101.20	Sewage lagoons, Minot, North Dakota
1,175	38.20	98.60	Quivira National Wildlife Refuge, Kansas
1,000	44.40	100.00	Hughes County, South Dakota
1,000	48.80	104.10	Goose Lake near Westby, Montana
984	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
853	30.20	92.70	Between Jennings and Welsh, Louisiana
821	50.40	106.60	Chaplin Lakes, Saskatchewan
800	38.10	102.60	Lamar, Colorado

July through December (Maximum count totals = 120,539)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
29511	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
22000	48.10	99.20	Minnewaukan Flats, Devil's Lake, North Dakota
21600	51.90	104.10	Quill Lakes, Saskatchewan
3000	46.90	96.80	North Dakota State University, Fargo, North Dakota
3000	47.10	99.80	Two miles east of Cherry Lake, Kidder County, North Dakota
2885	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
2850	31.50	92.30	Catahoula Lake, Louisiana
2500	48.30	99.20	Churchs Ferry, North Dakota
2478	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
2390	51.10	107.10	Luck Lake, Saskatchewan
2000	48.00	99.50	Benson County, North Dakota
1800	38.10	103.50	Cheraw, Colorado
1740	28.90	95.60	San Bernard National Wildlife Refuge, Texas
1504	30.20	92.30	Between Duson and Crowley, Louisiana
1152	38.20	98.60	Quivira National Wildlife Refuge, Kansas
940	38.10	103.70	Rocky Ford, Colorado
900	48.20	101.20	Sewage lagoons, Minot, North Dakota
700	48.00	97.10	Grand Forks Lagoons area, North Dakota
600	47.50	100.10	Goodrich, North Dakota
600	47.90	97.00	Grand Forks, North Dakota

Appendix. *Continued.*

Buff-breasted Sandpiper *(Tryngites subruficollis)*

January through June (Maximum count totals = 2,832)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
700	53.30	112.50	Beaverhill Lake, Alberta
355	30.20	92.30	Between Duson and Crowley, Louisiana
250	27.20	98.10	Falfurrias, Texas
200	52.40	106.00	Buffer Lake, Saskatchewan
175	35.50	97.70	Canadian County, Oklahoma
150	28.80	97.00	Victoria County, Texas
92	28.50	96.60	Magnolia Beach, Indianola Island, Calhoun County, Texas
92	48.80	100.80	Bottineau County, North Dakota
86	35.90	95.90	Arkansas River at Bixby, Tulsa County, Oklahoma
75	34.70	97.20	Pauls Valley, Garvin County, Oklahoma
75	36.20	95.90	Mohawk Park, Tulsa, Oklahoma
56	35.20	97.30	Cleveland County, Oklahoma
54	35.90	96.00	South Tulsa sod farms, Oklahoma
38	29.90	95.90	Rice field, Harris County and Waller County, Texas
31	29.30	89.90	Grand Terre, Jefferson Parish, Louisiana
30	35.40	97.60	Overholser and Hefner lakes, Oklahoma
29	36.00	95.70	Coweta sod farms, Wagoner County, Oklahoma
29	27.70	97.60	Nueces County, Texas

July through December (Maximum count totals = 3,747)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
337	36.00	95.60	Wagoner County, Oklahoma
300	27.30	97.70	Southern Kleberg County, Texas
281	36.00	95.70	Coweta sod farms, Wagoner County, Oklahoma
257	40.70	95.60	Riverton Wildlife Area, Fremont County, Iowa
182	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
160	35.90	95.90	Arkansas River at Bixby, Tulsa County, Oklahoma
125	51.90	104.10	Quill Lakes, Saskatchewan
120	35.90	95.50	Porter sod farms, Wagoner County, Oklahoma
90	28.50	96.60	Magnolia Beach, Indianola Island, Calhoun County, Texas
85	26.80	97.80	Pasture, south Kleberg County, Texas
75	36.10	95.90	Tulsa County, Oklahoma
72	44.50	109.10	Cody, Wyoming
71	33.90	96.80	Hagerman National Wildlife Refuge, Texas
65	50.20	97.10	Oak Hammock Marsh, Manitoba
63	30.20	97.40	Utley, Bastrop County, Texas
60	30.10	92.90	Between Lake Arthur and Holmwood, Louisiana
57	36.10	96.30	Keystone Lake, Oklahoma
52	44.70	93.00	Swan Lake National Wildlife Refuge, Missouri
44	43.20	98.50	Charles Mix County, South Dakota
44	36.50	95.60	Oolagah Reservoir, Rogers County, Oklahoma
41	30.20	97.60	Hornsby Bend Ponds, Texas
40	41.80	93.70	Northeast of Polk City, Polk County, Iowa
40	30.10	94.10	Six miles north of Interstate 10, west Jefferson County, Texas
35	41.80	91.50	Coralville Reservoir, Johnson County, Iowa
35	30.20	92.30	Between Duson and Crowley, Louisiana
34	38.20	98.60	Quivira National Wildlife Refuge, Kansas
33	37.80	97.50	Colwich, Sedgwick County, Kansas

Appendix. *Continued.*

Short-billed Dowitcher (*Limnodromus griseus*)

January through June (Maximum count totals = 21,891)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
3,500	29.30	89.90	Grand Terre, Jefferson Parish, Louisiana
3,400	29.90	95.90	Rice fields in Harris County and Waller County, Texas
3,200	30.20	92.00	Rice fields in Acadia Parish, Louisiana
1,600	29.60	94.60	Anahuac National Wildlife Refuge, Texas
1,500	29.50	94.60	Bolivar Flats, Texas
1,280	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
750	30.20	92.30	Between Duson and Crowley, Louisiana
734	28.00	97.10	Rockport area, Texas
600	29.20	95.00	West Galveston Island, Texas
511	38.20	98.60	Quivira National Wildlife Refuge, Kansas
450	28.70	96.10	Mad Island Wildlife Management Area, Texas
326	28.20	96.60	Matagorda National Wildlife Refuge, Texas
325	40.10	95.30	Big Lake State Park, Missouri
300	40.70	95.60	Riverton Wildlife Area, Fremont County, Iowa
200	29.10	90.20	Fourchon Beach, Louisiana
200	29.60	94.50	Rice fields, Rollover Bay, Chambers County, Texas
170	29.60	93.40	Sabine National Wildlife Refuge, Louisiana
150	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
125	45.30	97.50	Hawkinson Waterfowl Production Area, near Waubay, South Dakota
110	46.80	92.10	Duluth, Minnesota
110	36.70	95.60	Oolagah Reservoir, Nowata County, Oklahoma

July through December (Maximum count totals = 14,621)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
3,200	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
2,350	29.00	95.40	Eagle Lake, Texas
1,198	29.50	94.60	Bolivar Flats, Texas
1,120	31.50	92.30	Catahoula Lake, Louisiana
845	48.10	99.20	Minnewaukan Flats, Devil's Lake, North Dakota
500	45.80	108.50	Ponds, lakes, rivers, near Billings, Montana
450	50.90	106.20	Eyebrow Lake, Saskatchewan
437	50.70	107.50	Lake Diefenbaker, Saskatchewan
400	45.80	108.90	Border of Stillwater County and Yellowstone County, Montana
400	46.90	96.80	North Dakota State University, Fargo, North Dakota
380	46.10	96.10	Orwell Wildlife Management Area, Minnesota
267	28.30	96.80	Burgentine Lake, Aransas National Wildlife Refuge, Texas
250	45.90	109.10	Halfbreed National Wildlife Refuge, Montana
200	39.70	93.30	Swan Lake National Wildlife Refuge, Missouri
200	46.30	96.50	Breckenridge Sewage Lagoons, Minnesota
160	33.80	91.30	Oakwood Unit, Overflow National Wildlife Refuge, Arkansas
150	48.40	97.70	Walsh County, North Dakota
124	28.20	96.60	Matagorda National Wildlife Refuge, Texas
100	47.20	98.90	Arrowwood National Wildlife Refuge, North Dakota
95	38.20	98.60	Quivira National Wildlife Refuge, Kansas
90	33.40	104.50	Bitter Lake National Wildlife Refuge, New Mexico
90	40.70	95.60	Riverton Wildlife Area, Fremont County, Iowa
75	48.20	101.20	Sewage lagoons, Minot, North Dakota

Appendix. *Continued.*

Long-billed Dowitcher *(Limnodromus scolopaceus)*

January through June (Maximum count totals = 392,873)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
>60,000	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
53,712	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
27,000	39.30	118.70	Carson Lake, Nevada
25,000	41.20	112.30	Ogden area, Great Salt Lake, Utah
17,125	41.10	112.00	Layton Marsh, Great Salt Lake, Utah
12,000	41.10	112.10	Howard Slough Wildlife Management Area, Great Salt Lake, Utah
10,943	40.90	112.10	Farmington Bay, Great Salt Lake, Utah
10,000	29.60	94.60	Anahuac National Wildlife Refuge, Texas
10,000	41.30	112.20	Harold Crane Wildlife Management Area, Great Salt Lake, Utah
7,715	30.20	92.30	Between Duson and Crowley, Louisiana
6,500	47.80	112.10	Freezeout Lake, Montana
4,500	30.10	92.90	Between Lake Arthur and Holmwood, Louisiana
4,200	28.90	96.00	Rice field, Matagorda County, Texas
4,000	29.30	89.90	Grand Terre, Jefferson Parish, Louisiana
3,300	44.00	97.10	Lake County, South Dakota
3,000	47.70	111.30	Benton Lake National Wildlife Refuge, Montana
2,864	44.00	96.90	Milwaukee Lake, South Dakota
2,836	44.30	97.50	Lake Thompson, South Dakota
1,875	38.20	98.60	Quivira National Wildlife Refuge, Kansas
1,800	44.40	97.50	Kingsbury County, South Dakota
1,782	28.70	96.10	Mad Island Wildlife Management Area, Texas

July through December (Maximum count totals = 295,588)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
>60,000	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
50,000	39.40	119.10	Lahontan Valley, Nevada
30,000	48.10	99.20	Minnewaukan Flats, Devil's Lake, North Dakota
20,000	39.30	118.70	Carson Lake, Nevada
15,000	39.50	118.60	Stillwater National Wildlife Refuge, Nevada
15,000	48.00	98.90	Devil's Lake, North Dakota
14,626	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
11,735	47.70	111.30	Benton Lake National Wildlife Refuge, Montana
11,150	41.10	112.10	Howard Slough Wildlife Management Area, Great Salt Lake, Utah
10,000	40.50	118.50	Humboldt Wildlife Management Area, Nevada
9,000	48.60	100.70	J. C. Salyer National Wildlife Refuge, North Dakota
5,975	31.50	92.30	Catahoula Lake, Louisiana
4,650	40.90	112.10	Farmington Bay, Great Salt Lake, Utah
3,003	28.70	96.10	Mad Island Wildlife Management Area, Texas
3,000	48.00	99.50	Benson County, North Dakota
2,500	41.30	112.20	Harold Crane Wildlife Management Area, Great Salt Lake, Utah
2,500	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
2,306	30.20	92.30	Between Duson and Crowley, Louisiana
2,181	30.10	92.90	Between Lake Arthur and Holmwood, Louisiana
2,000	48.60	102.40	Montrail County, North Dakota
1,975	38.20	98.60	Quivira National Wildlife Refuge, Kansas
1,605	51.10	107.10	Luck Lake, Saskatchewan
1,235	48.20	101.20	Sewage lagoons, Minot, North Dakota
1,200	48.60	101.60	Upper Souris National Wildlife Refuge, North Dakota

Appendix. *Continued.*

All Dowitchers

January through June (Maximum count totals = 496,747)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
>60,000	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
53,712	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
27,002	39.30	118.70	Carson Lake, Nevada
25,000	41.20	112.30	Ogden area, Great Salt Lake, Utah
17,125	41.10	112.00	Layton Marsh, Great Salt Lake, Utah
14,342	29.50	94.60	Bolivar Flats, Texas
13,815	30.20	92.30	Between Duson and Crowley, Louisiana
12,733	29.60	94.60	Anahuac National Wildlife Refuge, Texas
12,000	41.10	112.10	Howard Slough Wildlife Management Area, Great Salt Lake, Utah
10,943	40.90	112.10	Farmington Bay, Great Salt Lake, Utah
10,000	41.30	112.20	Harold Crane Wildlife Management Area, Great Salt Lake, Utah
9,344	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
8,700	29.90	95.90	Rice fields in Harris County and Waller County, Texas
8,318	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
7,500	29.30	89.90	Grand Terre, Jefferson Parish, Louisiana
7,332	28.90	95.60	San Bernard National Wildlife Refuge, Texas
6,501	47.80	112.10	Freezeout Lake, Montana
6,064	29.70	94.60	Chambers County, Texas
4,550	53.30	112.50	Beaverhill Lake, Alberta
4,503	30.10	92.90	Between Lake Arthur and Holmwood, Louisiana
4,201	44.00	96.90	Milwaukee Lake, South Dakota
4,200	28.90	96.00	Rice field, Matagorda County, Texas

July through December (Maximum count totals = 375,736)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
>60,000	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
50,002	39.40	119.10	Lahontan Valley, Nevada
33,800	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
33,800	41.50	112.20	Bear River National Wildlife Refuge, Great Salt Lake, Utah
30,845	48.10	99.20	Minnewaukan Flats, Benson County, North Dakota
20,002	39.30	118.70	Carson Lake, Nevada
15,002	48.00	98.90	Devil's Lake, North Dakota
15,001	39.50	118.60	Stillwater National Wildlife Refuge, Nevada
11,735	47.70	111.30	Benton Lake National Wildlife Refuge, Montana
11,150	41.10	112.10	Howard Slough Wildlife Management Area, Great Salt Lake, Utah
10,000	40.50	118.50	Humboldt Wildlife Management Area, Nevada
9,000	48.60	100.70	J. C. Salyer National Wildlife Refuge, North Dakota
7,568	51.10	107.10	19 km west of Luck Lake, Saskatchewan
7,095	31.50	92.30	Catahoula Lake, Louisiana
4,650	40.90	112.10	Farmington Bay, Great Salt Lake, Utah
4,032	28.50	96.60	Magnolia Beach, Indianola Island, Calhoun County, Texas
4,000	54.30	110.70	Rice Lake National Wildlife Refuge, Minnesota
3,905	26.30	97.40	Laguna Atascosa National Wildlife Refuge, Texas
3,500	51.90	104.10	Quill Lakes, Saskatchewan
3,348	30.20	92.30	Between Duson and Crowley, Louisiana
3,235	38.20	98.60	Quivira National Wildlife Refuge, Kansas

Appendix. *Continued.*

Common Snipe *(Gallinago gallinago)*

January through June (Maximum count totals = 5,838)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
650	39.40	91.10	Ted Shanks Wildlife Area, Missouri
410	30.20	92.30	Between Duson and Crowley, Louisiana
340	29.30	98.50	Mitchell Lake, Bexar County, Texas
300	34.80	91.90	Joe Hogan Fish Hatchery, Arkansas
230	34.70	91.60	North of Slovak on Highway 11, Prairie County, Arkansas
220	29.10	95.20	Brazoria National Wildlife Refuge, Brazoria County, Texas
200	32.20	91.30	Wilderness Field, Tensas River National Wildlife Refuge, Louisiana
185	33.90	96.80	Hagerman National Wildlife Refuge, Texas
152	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
150	41.70	91.50	Iowa City, Johnson County, Iowa
143	32.00	102.10	Midland, Texas
122	47.90	97.40	Grand Forks County, North Dakota
115	30.20	92.70	Between Jennings and Welsh, Louisiana
110	36.70	98.20	Salt Plains National Wildlife Refuge, Oklahoma
100	42.00	96.20	Blue Lake, Monona County, Iowa
83	43.10	94.70	Emmetsburg, Palo Alto County, Iowa
83	36.20	95.90	Mohawk Park, Tulsa, Oklahoma
83	33.40	104.50	Bitter Lake National Wildlife Refuge, New Mexico
80	29.30	89.90	Grand Terre, Jefferson Parish, Louisiana
78	41.90	93.20	Hendrickson Marsh, Story County, Iowa
75	40.70	95.60	Riverton Wildlife Area, Fremont County, Iowa

July through December (Maximum count totals = 6,778)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
942	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
400	40.70	95.60	Riverton Wildlife Area, Fremont County, Iowa
400	39.40	91.10	Ted Shanks Wildlife Area, Missouri
330	30.20	92.30	Between Duson and Crowley, Louisiana
250	40.10	95.30	Big Lake State Park, Missouri
225	33.40	104.50	Bitter Lake National Wildlife Refuge, New Mexico
203	48.60	100.70	J. C. Salyer National Wildlife Refuge, North Dakota
177	50.20	97.10	Oak Hammock Marsh, Manitoba
150	46.60	114.10	Lee Metcalf National Wildlife Refuge, Montana
130	36.20	94.10	Springdale, Benton County, Arkansas
121	37.00	90.20	Mingo National Wildlife Refuge, Missouri
108	29.40	98.50	Brdwy/Wetmore, San Antonio, Texas
102	41.90	93.70	Slater Ponds, Story County, Iowa
100	42.10	93.10	North of Clemons, Marshall County, Iowa
100	40.60	105.10	Fort Collins, Colorado
100	32.50	94.70	Longview, Texas
80	40.40	104.10	Jackson Reservoir, Morgan County, Colorado
78	47.20	98.90	Arrowwood National Wildlife Refuge, North Dakota
74	31.00	103.70	Lake Balmorhea, Texas
72	39.80	104.90	Denver, Colorado
67	45.00	93.50	Hennepin County, Minnesota
65	28.70	96.10	Mad Island Wildlife Management Area, Texas
62	44.80	96.60	Rush Lake, Deuel County, South Dakota
60	41.80	93.70	Northeast of Polk City, Polk County, Iowa

Appendix. *Continued.*

Wilson's Phalarope (*Phalaropus tricolor*)

January through June (Maximum count totals = 392,313)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
146,000	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
138,102	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
>100,000	41.10	112.10	Howard Slough Wildlife Management Area, Great Salt Lake, Utah
32,850	41.10	112.00	Layton Marsh, Great Salt Lake, Utah
10,000	41.20	112.00	South shore, Great Salt Lake, Utah
8,055	41.70	102.50	Crescent Lake National Wildlife Refuge, Nebraska
7,100	50.40	106.60	Chaplin Lakes, Saskatchewan
6,200	44.40	97.50	Kingsbury, South Dakota
4,000	38.50	100.90	Scott County, Kansas
3,592	44.30	97.50	Lake Thompson, South Dakota
2,752	47.00	99.70	Sibley Lake area, Kidder County, North Dakota
2,555	29.90	95.90	Rice fields in Harris County and Waller County, Texas
2,183	38.20	98.60	Quivira National Wildlife Refuge, Kansas
2,000	39.30	98.50	Wilson State Park and Wildlife Area, Kansas
2,000	29.30	98.50	Mitchell Lake, Bexar County, Texas
2,000	38.10	102.60	Lamar, Colorado
2,000	41.90	102.10	Alkali Lake, Grant County, Nebraska
1,867	41.50	112.20	Bear River National Wildlife Refuge, Great Salt Lake, Utah
1,785	47.70	111.30	Benton Lake National Wildlife Refuge, Montana
1,600	48.20	101.20	Sewage lagoons, Minot, North Dakota
1,500	44.00	97.10	Lake County, South Dakota
1,500	48.20	101.30	Oak Park, Minot, North Dakota
1,322	38.40	115.10	Kirch Wildlife Management Area, Nevada
1,159	44.00	96.90	Milwaukee Lake, South Dakota
1,118	28.90	95.60	San Bernard National Wildlife Refuge, Texas
1,100	34.00	102.70	Muleshoe National Wildlife Refuge, Texas
1,036	33.40	104.50	Bitter Lake National Wildlife Refuge, New Mexico

July through December (Maximum count totals = 827,126)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
330,150	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
250,000	41.00	112.20	Antelope Island, Great Salt Lake, Utah
200,000	41.10	112.00	Layton Marsh, Great Salt Lake, Utah
125,000	41.10	112.10	Howard Slough Wildlife Management Area, Great Salt Lake, Utah
55,000	41.00	112.10	North Farmington Bay, Great Salt Lake, Utah
35,650	40.90	112.10	Farmington Bay, Great Salt Lake, Utah
30,000	41.20	112.00	South shore, Great Salt Lake, Utah
25,000	41.50	112.20	Bear River National Wildlife Refuge, Great Salt Lake, Utah
11,000	39.50	118.60	Stillwater National Wildlife Refuge, Nevada
10,722	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
10,000	36.10	102.00	Between Cactus Lake and Etter, Moore County, Texas
8,000	41.00	111.90	West of Interpretive Center, Great Salt Lake, Utah
6,192	50.40	106.60	Chaplin Lakes, Saskatchewan
5,000	41.30	112.20	Harold Crane Wildlife Management Area, Great Salt Lake, Utah
4,500	34.00	102.70	Muleshoe National Wildlife Refuge, Texas
3,844	42.10	102.50	Sheridan County, Nebraska
3,500	48.20	101.20	Sewage lagoons, Minot, North Dakota
3,000	47.60	99.70	Wells County, North Dakota

Appendix. *Concluded.*

Red-necked Phalarope *(Phalaropus lobatus)*

January through June (Maximum count totals = 225,442)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
45,188	51.90	104.10	Quill Lakes, Saskatchewan
43,000	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
42,100	41.10	112.00	Layton Marsh, Great Salt Lake, Utah
34,245	52.70	109.70	Manito Lake and Wells Lake, Saskatchewan
20,000	52.60	110.10	Kellarney Lake and Leane Lake, Alberta,
15,000	41.10	112.10	Howard Slough Wildlife Management Area, Great Salt Lake, Utah
11,890	52.20	108.50	Landis Lake, Saskatchewan
8,000	42.80	106.30	Casper, Wyoming
7,755	50.40	106.60	Chaplin Lakes, Saskatchewan
4,000	53.30	112.50	Beaverhill Lake, Alberta
3,545	52.10	110.70	Gooseberry Lake, Alberta
3,500	48.20	101.20	Sewage lagoons, Minot, North Dakota
2,500	41.60	109.20	Rock Springs, Wyoming
2,000	46.00	109.20	Northwest of Billings, Montana
1,900	48.00	100.60	Connia Slough, McHenry County, North Dakota
1,775	51.10	107.10	Luck Lake, Saskatchewan
1,655	33.40	104.50	Bitter Lake National Wildlife Refuge, New Mexico
1,500	48.00	98.60	East Devil's Lake, North Dakota
1,500	47.70	111.30	Benton Lake National Wildlife Refuge, Montana
1,500	48.20	101.50	Minot, North Dakota
1,241	38.30	98.80	Cheyenne Bottoms Wildlife Management Area, Kansas
1,100	38.90	107.90	Delta, Colorado

July through December (Maximum count totals = 48,206)

Maximum Count	Latitude (°N)	Longitude (°W)	Location
10,000	39.30	118.70	Carson Lake, Nevada
9,522	51.90	104.10	Quill Lakes, Saskatchewan
7,000	53.30	112.50	Beaverhill Lake, Alberta
3,500	47.80	112.10	Freezeout Lake, Montana
3,300	**(See Appendix Legend)**		**Great Salt Lake area, Utah, single site analysis**
3,000	41.10	112.10	Howard Slough Wildlife Management Area, Great Salt Lake, Utah
1,800	51.10	107.10	Luck Lake, Saskatchewan
1,200	48.00	98.80	Black Tiger Bay, Devil's Lake, North Dakota
1,200	48.20	101.20	Sewage lagoons, Minot, North Dakota
1,000	41.10	112.00	Layton Marsh, Great Salt Lake, Utah
900	47.60	101.20	Audubon National Wildlife Refuge, North Dakota
800	41.20	112.30	Ogden area, Great Salt Lake, Utah
766	39.40	119.10	Lahontan Valley, Nevada
725	42.10	102.50	Sheridan County, Nebraska
655	48.00	98.90	Sewage ponds, Devil's Lake, North Dakota
600	58.70	94.10	Churchill area, Manitoba
500	47.70	111.30	Benton Lake National Wildlife Refuge, Montana
400	33.40	104.50	Bitter Lake National Wildlife Refuge, New Mexico
380	41.70	111.80	Barrens, Cache County, Utah
250	45.90	109.10	Halfbreed National Wildlife Refuge, Montana
200	47.90	97.00	Grand Forks, North Dakota
200	37.60	113.20	Quichapa Lake, Utah
200	39.50	118.80	Fallon, Nevada

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13. ABSTRACT (Maximum 200 words)

Distribution patterns and temporal occurrence of transcontinental shorebird migrants refueling in interior wetlands of North America were generated from a contributed database of more than 33,000 surveys from 3000 sites. Five general patterns of migration distribution and two chronology patterns are described. During spring migration, long-distance migrants stop to refuel primarily within a narrow band between 90^0 and 100^0 W longitude whereas short distance migrants are more widespread in distribution. The information on distribution and timing suggest that some species make northward flights of short to intermediate distances rather than long distances between stopover sites. Preliminary interpretations of spring migration patterns of ten species of the genus *Calidris* suggest that wintering distribution, migration distance, and breeding destination in concert appear to determine spring migration distribution. This document can be used to identify areas critical to migrating shorebirds, to assist in decisions on conservation and acquisition efforts, and to provide planners and land managers with a perspective of scale necessary for effective management. Management of dispersed and dynamic wetland habitats for the conservation of en route shorebird migrants is a challenge that requires a broadly integrated approach across many geographic regions.

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